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January-February 1996

Issue 64

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In This Issue:
- *Lady Marjorie* - a Clinker-built Launch
- *Bandosaurus* - A Home-made Bandsaw
- Air Operated Points Control System

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The Cover

"Lady Marjorie" — a steam pleasure launch who's design dates back 100 years. It has an LPG fired boiler, powering a Bolton No.5 engine. Don Hinchliffe tells his story on page 9.

Photo: Tom Hulse

Australian Model Engineering

Crew

Managing Editor

Brian Carter ....(02) 649-5301
Bus. Hrs.(mobile)...........018 022209
Fax (24 hrs)........(02) 646-1362
email: b.carter@edfac.usyd.edu.au

Contributing Editors

Leigh Adams, Melanie Dennis, Neil Graham, Dave Harper, Clive Huggan

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Comment

Model Engineering — an enjoyable hobby!

Part one

In the absence of comments from our readers — due to the tight deadline for this issue, not to mention the late delivery of the November-December AME to some areas — I thought I'd kick start the year along with some thoughts of my own.

The main feature that enticed me in to model engineering, besides my passion for steam powered machinery, was the fellowship of people I met, nobody was afraid to say g'day and ask me about my interest in model engineering: I was only in my early twenties at the time! Sure, you could say that about a lot of hobby activities, but there was something there and I am not sure I could describe it. The best thing is that it is still there — somewhere!

A lot of hobby activities are, to a degree, self centered. I suppose model engineering is too, but when you combine the activity with a club environment, it is far from self centered. Modellers giving up their time and talents to help a club grow and develop. To see the joy on the faces of the mums, dads and kids on a public open day. Listening and responding to the questions they ask — all the activity of the day — it is a real sharing experience!

Then there is the workshop environment. A time for quiet, a time to gather your thoughts: your own space! It's a good balance — you don't have to share 100% of the time. You have the time to expand your talents and produce works of art. Even if "art" is in the eye of the beholder — it doesn't matter, just enjoy yourself. I must confess that despite (or because of) the pressure of producing this magazine, I still need to spend time in the workshop, otherwise I'd go nuts! It's a great safety valve.

Another feature of the hobby that I like is the number of active senior modellers. I must admit that I still have a way to go before I can join their ranks, but when you hit the mid-forties you tend to take notice of these things! You see reports on TV, radio and in the papers of the number of retired people who seem to give up on life after retirement. All I can say is they haven't discovered model engineering yet!!! I don't know too many senior model engineers that have time to worry about lack of something to do.

I have have been waffling long enough. Now it's your turn, don't just sit there agreeing with me, let's know what makes model engineering enjoyable for you — even if it is just an expansion of my thoughts. I've called this part one, parts two thru six is up to you!

Have a happy and healthy new year, to you and your family.

Brian Carter

To our new reader

If this is your first issue of Australian Model Engineering, welcome! We hope you'll look forward to the ideas, news and camaraderie in each bi-monthly issue.

One of the great things about our hobby is the way model engineers actively help each other. Unless you live in an isolated community, you'll soon discover who has valuable experience in your field of interest, or who will help you to make a part that's too big for your workshop machinery. Look in the *Club Roundup* section to find a club that's near to you; pay a visit and you'll usually find model engineers who live not too far away. Then you can experience the great fellowship that makes our hobby special.

This magazine is prepared in the same spirit of "model engineers helping each other". About two dozen people put many hundreds of hours work into each issue — all on a voluntary basis — to help model engineers in Australia and New Zealand keep up to date and stay in touch.

We rely on our readers to write articles for us — for the same (non-existent) rate of pay! If you have ideas or techniques that you feel would be interesting to others, please drop us a line. We'll gladly help with preparation of artwork or editing if that's necessary. Most important of all, please support the people who advertise in our magazine. Without them to pay the bills, you wouldn't be reading this!

Brian Carter

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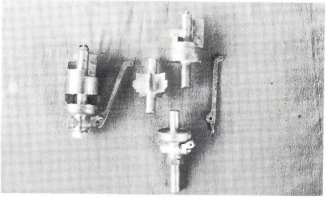

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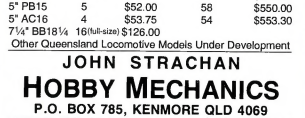

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A Clinker-built Steam Launch

by Don Hinchliffe

photos by Tom Hulse

My friends have asked me to write about the steam boat which I built several years ago.

Her name is *Lady Marjorie*, after the other lady in my life, my wife. Having worked on the waterfront as a boat builder for most of my life, I have seen several of this style of boat. *Lady Marjorie* is designed from these memories, with a length of 1260mm, beam 370mm and depth of 170mm.

I based my design on a steam pleasure launch of about 100 years ago, and built it of timbers which I think would have been used at that time: maple, red cedar and teak.

Planked construction

The hull is of clinker construction using planking about 15mm by 3mm. All timbers are correctly shaped, including being half rebated at each end where they butt into the stem and transom. The majority of the planks had to be steamed to fit correctly around the frames. The inside of the hull was then fibre glassed to protect it from water and oil coming from the boiler and engine. The stem and keel are made up of laminated teak. To finish off the hull I planked the transom with nicely grained teak, with teak surrounds.

The maple planking was then stained mahogany and given six coats of satin Estapol®.

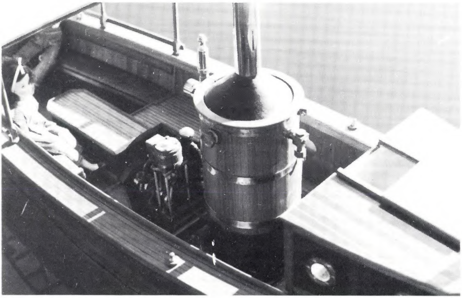
The deck is planked with 5mm by 0.5mm teak with black caulking between the planks.

The forward cabin was framed up with 1.5mm marine plywood, and to this I glued 10mm by 1mm red cedar timber. The top of the cabin is built from 10mm by 1mm red cedar with 0.5mm beech strips separating them, and at the back of the cabin are two teak louvred doors. All edges and corners are finished off with teak trims. Brass portholes were fitted to the sides and front of the cabin.

Controlling from the bank

Battery powered electrical servos, activated by radio, control the rudder for direction and propeller pitch for speed and forward/reverse. Under the back canopy there are seats on either side and a dummy engine box in the centre. On the port side is a cupboard, under which is the servo to control the pitch of the propeller. There are removable panels under the seats for radio gear, batteries etc. The back canopy sits on six turned teak posts, the canopy roof beams being moulded red cedar with marine plywood fitted on top. To finish the top off, I used rubber-backed holland blind material which was glued to the plywood. A coat of Scotchgard® protects it from oil and dirty finger marks.

Sycamore flooring was used throughout the boat, with teak edgings on the inside of the hull. In the engine room area vertical 10mm teak planks were fitted on to removable plywood sheeting.



*The view down into the **Lady Marjorie** showing boiler and engine*

*Ripples break the morning calm of a lake at Boondall in Brisbane as **Lady Marjorie** steams peacefully toward the bank.*

Engine and boiler

The engine room consists of a 170mm by 100mm vertical copper boiler with six vertical firetubes, supplying superheated steam via two copper coils around the bottom of the boiler to a Bolton No. 5 ⅝" by ⅝" engine. Both the boiler and engine are clad in teak. The engine is connected to the shaft of a modified Ron Adams design 70mm three-bladed variable pitch propeller. I use LPG to fire the boiler, with the bottle being enclosed in the forward cabin.

The forward cabin, back canopy and interior timbers are all finished in gloss Estapol, and for the decking I used flat Estapol.

Building time was approximately 1000 hours over two years. It takes six to seven minutes to steam up to 40 psi and I get one to one and a quarter hours steaming from the one fill of the boiler.

I have found *Lady Marjorie* to be a very good boat to handle under way, regardless of the weather conditions.

Power for your Points

Signal cabin control of air operated points linked to colour light signals

Part 1 — Introduction and Mechanical

by Tom Hulse; photos and drawings by the author

Nostalgia is a powerful motivater amongst model engineers, but this is usually tempered by a matching curiosity which at least gives the future a chance. Railway signals provide a case in point — semaphore signals for nostalgia or colour light signals for the convenience of the future? With points — will it be rods or power assisted?

For some years the Queensland Society of Model and Experimental Engineers (QSMEE) have used a mechanical lever frame and rod apparatus for changing points at its Pine Valley track in the northern Brisbane suburb of Warner. The point levers are situated in a signal cabin, about the size and shape of a telephone box, at the end of the station platform.

A lung-full of nostalgia

Pulling in to the station to change passengers brings the loco to a halt under the signal cabin awning. With the blower turned down and a little fresh Blair Athol coal added, a potent brew starts to accumulate from firebox to smokebox. As you are ready to go, the blower is opened, the brew erupts upwards and the awning directs it into the signal cabin. The driver departs with an evil smirk on his face leaving behind a cloud of black smoke enveloping the waving arms of the signal operator.

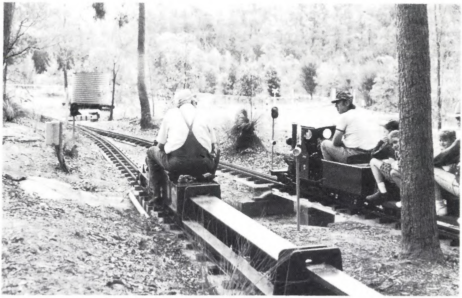
QSMEE is no different from many other societies in that there is always something new being planned or being built. A smart new (well, relatively new) high-level and commodious signal box has been ready for use for some time; a new main line and revamped station meant that the old signal cabin had to go together with all the mechanical point gear. This provided an ideal opportunity to install new electro-pneumatic operated points protected by interlocked colour light signals. All this is operated from a small mimic panel in the new signal box, well clear of the smoke.

Team effort

Being a club project, many members have assisted in design and construction, with Barry Coster and Brad Benfield making significant contributions. Barry evolved the concept and was the "driving force", while Brad took responsibility for constructing the point operating mechanism. I was involved with the electrics and mimic panel.

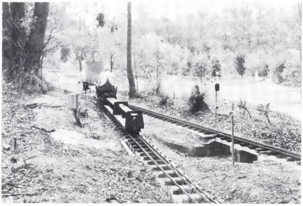
What this article is about

This article will lead you through the steps taken to build and install air powered points and associated signals for a 5/7¼ inch gauge ground-level track. Construction details will be given for the point motor, signals and associated electric control panels and circuitry. Two point configurations will be described. With a knowledge of the basic design, builders should be able to construct other configurations.



The scene: the main and siding are held on the red...

...the main gets the green...



...and finally the siding is clear to proceed.

Not all clubs have members familiar with electrical circuitry, so this part of the construction has been kept relatively straightforward and will be explained fully. There are no electronics other than the use of light-emitting diodes in the mimic panel, and the power supply if you choose to build one.

Specification

Two major considerations in the design specification were safety and simplicity. The point motor was designed to operate only when air is momentarily applied to either end of the actuating cylinder, so that if the supply of air fails while a train is over the point, the point will not move. This increases the cost of the solenoid valve, but was considered vital for safety. The point is not locked during operation (although there is provision for pin locking that will be described later) so that trains will trail through them — i.e., when approached from the "wrong" direction the loco wheels will force the point over and so avoid derailing. The

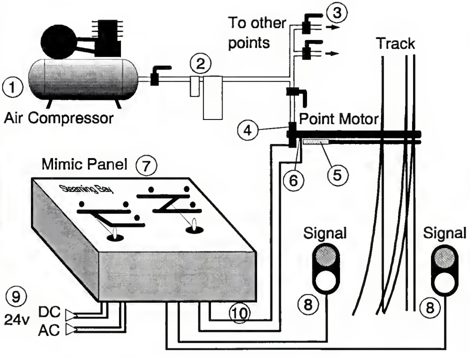


Figure 1 - Block diagram of the complete system

point motor has been designed using "industrial strength" components to ensure a reliable and lengthy service with minimum maintenance. The additional cost of this approach is minimal.

The position of the switch blades is shown on the mimic panel in the signal cabin. This information is derived from independent microswitches mounted on the point motor. This confirmation ensures that the signal cabin can detect operating problems and a green signal is not given when the operation of a point has been prevented due to twigs or other debris jamming the switch blades.

Because the point motor is situated on the ground, it is designed to withstand dust, dirt and water. The cylinder action is translated directly to the switch blades, thus avoiding trouble-prone linkages. The actuating bar moves on large sturdy rollers. Now in use for some months, the motors have a problem free record.

Safety interlocks are built in to the electrical circuit. The point motor can not be operated until all approach signals are set to red, and a signal cannot be set to green if the point is not set for the track controlled by that signal.

The job's not done until...

As a club project it is important that good records are kept of the construction so that those that come after the original builders can easily discover how everything works. I cannot emphasise this enough as in the original flush of enthusiasm to see the points working and the mimic panel brightly lit it is easy enough not to commit things to paper. Site wiring with associated distribution boxes is not part of this article, but it's important to provide local wiring description sheets and copies of this article to facilitate fault finding.

Maintenance and spare parts

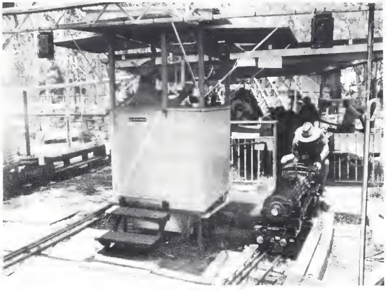
Through the life of this equipment there are likely to be some failures. When that happens in a club environment, the use of standard components from reputable companies will be confirmed as the right decision. This comment is after attempts to build an air control valve due to the relatively high cost of commercial items. It's a lot harder than we thought (I can see all the pneumatics engineers smiling), and would have led to future spare part problems anyhow, so the budget had to accommodate the extra cost.

How it works

The block diagram in Figure 1 displays the component parts and we'll quickly step through them to give you an idea what you are in for if you decide to build.

Providing air power

Points are powered by air from an air compressor (1). The compressor has little work to do so it can be small ($0.23m^3$ ($8 ft^3$) should be adequate) unless it is to have other uses. Pres-



Signal box metamorphosis. Out with the old......

....and in with the new

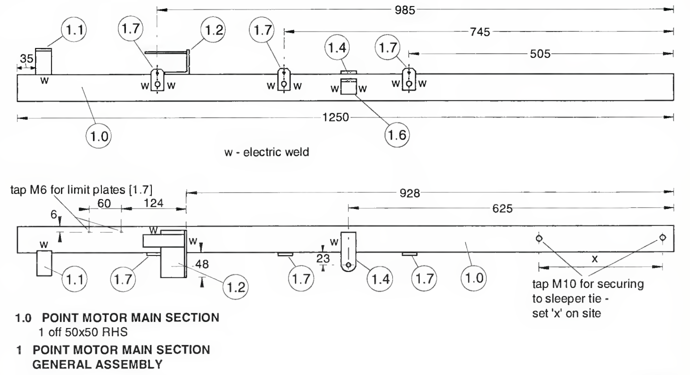


Figure 2

sure at the point air cylinder needs to be over 241 kPa (35 psi) (to hold the seals in the air cylinder against the cylinder wall) but also needs to be low for safety. We use 276 kPa (40 psi) and have found it quite satisfactory. Air reticulation is by 10mm OD black nylon airline to standard BS5409. This is routed via a filter and reservoir (2) to a distribution block(s) (3) which divide the air supply into several ball-valve-controlled supplies for points in different parts of the track. These ball valves are mounted about 400mm above ground level on steel posts.

Most of the black nylon airline is buried in the ground. Connections are made to the point motor using 10mm to 6mm OD reducing fittings and modern "push fit" connectors.

The point motor

The base of the point motor is a length of 50mm square RHS bolted at one end to a track sleeper or under the track. Various brackets are welded to the tube to carry the air cylinder (5), actuating rod, solenoid valves (4) and microswitches (6). The movement of the air cylinder piston is directly transmitted to the switch blades by the actuating rod.

The two items that might tax the budget here are the air cylinder and solenoid valve, which together will cost approximately $120 per turnout if you have to buy them new.

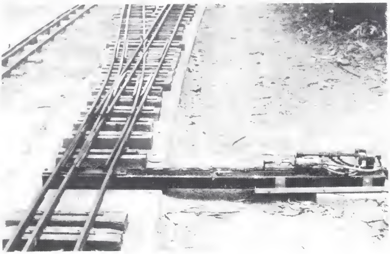
The mimic panel (7) has a representation of the track and points drawn on the front panel, upon which the switches and light-emitting diodes are mounted. Cables (10) from the mimic panel take the 24 volt control voltages to the solenoid valve (4) and other wires are connected to the microswitches (6) that detect point position.

Other cables carry 24 volt AC to the signals (8). The signals use an aluminium casting mounted on a length of galvanised water pipe. The 24 volt AC and DC is provided by a suitable power supply (9), which will be also be described.

Construction - backbone tube

Start by making the various brackets. The Manual Lock Brackets A and B [Items 1.6, 1.4] and the Solenoid Bracket [1.1] are cut from mild steel angle and flat, drilled where necessary, and cleaned up with a file. The

View of the complete point motor, with protective cover removed.



Another view of the installed point motor.

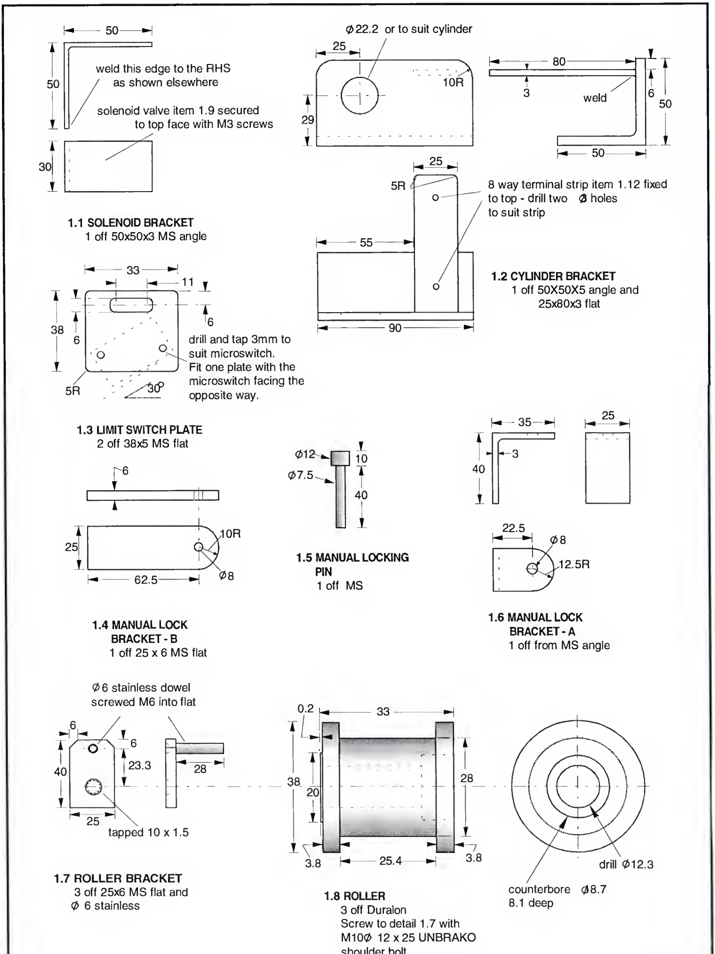

50
50
30
weld this edge to the RHS as shown elsewhere
solenoid valve item 1.9 secured to top face with M3 screws
1.1 SOLENOID BRACKET
1 off 50x50x3 MS angle
Ø22.2 or to suit cylinder
25
10R
29
80
3
weld
6
50
50
25
5R
8 way terminal strip item 1.12 fixed to top - drill two Ø holes to suit strip
55
90
1.2 CYLINDER BRACKET
1 off 50X50X5 angle and 25x80x3 flat
33
11
38
6
6
drill and tap 3mm to suit microswitch.
Fit one plate with the microswitch facing the opposite way.
5R
30°
1.3 LIMIT SWITCH PLATE
2 off 38x5 MS flat
6
25
10R
62.5
Ø8
1.4 MANUAL LOCK BRACKET - B
1 off 25 x 6 MS flat
Ø12
Ø7.5
10
40
1.5 MANUAL LOCKING PIN
1 off MS
35
3
40
25
22.5
Ø8
12.5R
1.6 MANUAL LOCK BRACKET - A
1 off from MS angle
Ø6 stainless dowel screwed M6 into flat
6
6
40
23.3
28
25
tapped 10 x 1.5
1.7 ROLLER BRACKET
3 off 25x6 MS flat and Ø 6 stainless
0.2
33
38
20
28
3.8
25.4
3.8
drill Ø12.3
counterbore Ø8.7 8.1 deep
1.8 ROLLER
3 off Duralon
Screw to detail 1.7 with M10Ø 12 x 25 UNBRAKO shoulder bolt

Figure 3

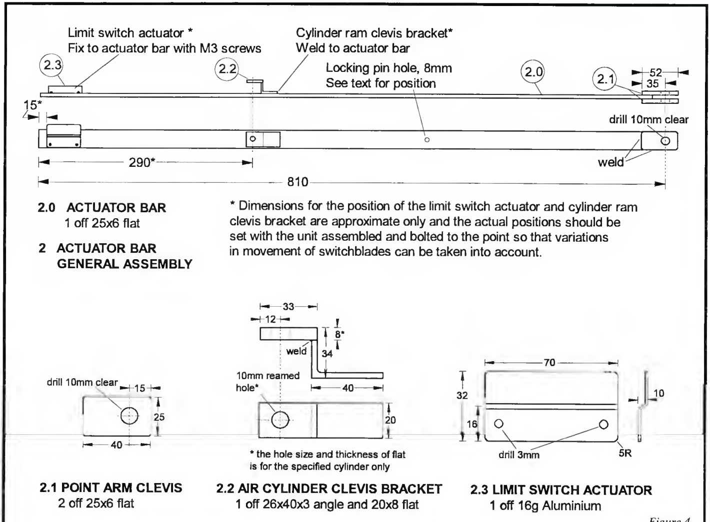


Figure 4

Cylinder Bracket angle [1.2] will need to be set in the four jaw chuck so that the larger hole can be bored before welding on the 80mm length of flat. The size of the hole depends on the size of the cylinder mount screw that you will be using; for the type specified this is 22.2mm.

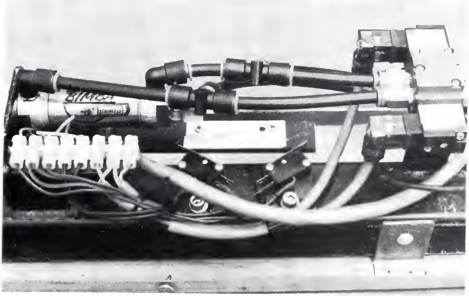
The Roller Bracket [1.7] has two tapped holes, and a 6mm diameter stainless dowel is screwed securely into one of the holes. To ensure accurate positioning of the dowel and roller, care should be taken in tapping the holes. This can be done in the lathe using the tapholder loosely held in the tailstock chuck and the Bracket held squarely in the four-jaw chuck, or by using the drill press in a similar fashion but with the Bracket held squarely in the drill press vice.

Cut a 1250mm length of 50mm square 3mm wall RHS (Rectangular Hollow Section) mild steel [1.0] and clean up the ends with a file.

Weld the three Roller Brackets [1.7] flat to the side of the RHS at distances of 505mm, 745mm and 985mm from the point end. The Roller Brackets are positioned so that the lower edge of the stainless dowel is in line with the top edge of the RHS.

Place the edge of the angle web of the Cylinder Bracket against the third Roller Bracket as shown in Figure 2 and weld to the top of the RHS so that 48mm of the Cylinder Bracket projects out from the RHS.

Manual Lock Brackets A and B [1.6, 1.4] are welded to the RHS 625mm from the point end. They are welded so that the pin holes line up, with Bracket A on the top of the RHS and Bracket B on the side. This is shown in Figure 2.



Detail at the cylinder end, showing the connector block and limit switches.

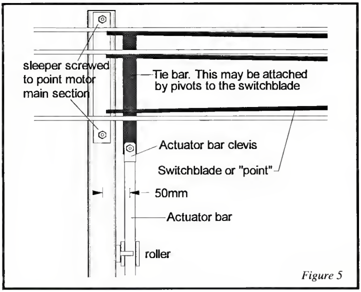


Figure 5


Connection of the point motor body and actuator bar to the point.

Finally the web edge of the Solenoid Bracket [1.1] is welded to the top of the RHS 35mm in from the cylinder end of the RHS, as shown in Figure 2.

Rollers

Using 40mm diameter Duralon® or similar hard plastic rod, turn up three Rollers [1.8] which are secured to the Roller Brackets using UNBRAKO® shoulder bolts. The threaded portions of shoulder bolts are on a reduced diameter to the shank and are ideal for use as axles for the Rollers. The Rollers should be drilled so that they are free-running on the bolts without being sloppy.

Limit switch plates

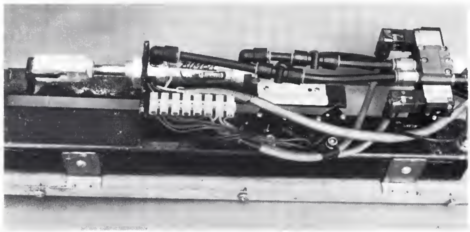
The two limit switch plates [1.3] are cut from 38x5 flat steel and a 6 mm wide slot is milled or filed between two 6mm holes 11mm apart. The selected microswitches are now fitted at a 30 degree angle on the plate using M3 screws. One microswitch is fitted opposite to the other so that the two, when bolted to the RHS, can be operated as the actuator bar moves to its extremes.

Actuator bar

The actuator bar [2.0], a 810mm length of 25x6 flat steel, sits horizontally in the groove of the Rollers under the stainless dowels. At the point motor end two plates are welded to the bar to form a clevis in which the switch blade bar is ultimately fitted and pinned using a M10 x 25 bolt.

The Solenoid Valve [1.9] is secured to the top of the Solenoid Bracket [1.1] after drilling and tapping the Bracket to suit the fixing holes. It is positioned so that the electrical entries are facing toward the track and downwards.

An eight-way terminal strip, cut from the purchased twelve-way strip with a sharp knife, is fitted with 3mm screws to the top face of the flat welded to the Cylinder Bracket [1.2].


Another view of the cylinder end of the point motor, showing solenoid and cylinder clevis.

Track fitting

The point should be constructed so that there is a steel sleeper 50mm away from the actuator bar which is secured to the tie bar, as shown in Figure 5. There is probably a flexible linkage of some sort between the actuator bar and tie bar. The RHS is screwed under the steel sleeper with two M10 screws at either end. One end of the RHS is flush with the end of the sleeper.

With the RHS screwed to the track and the actuator bar attached to the tie bar, bolt the Cylinder in position. Fit and pin the cylinder clevis bracket [2.2] into the Cylinder clevis and pull the cylinder piston rod out as far as possible. Push the switch blades hard away from the point motor and clamp the Cylinder clevis bracket to the actuator bar. Now push the cylinder piston rod in until the switch blade is hard against the point motor side of the track. If the piston rod is not fully home, re-adjust the clamp until piston rod movement is central to the cylinder when the tie bar is moved from one extreme to the other.

Weld the clevis bracket [2.2] to the actuator bar before removing the clamp.

Secure the limit switch plates to the RHS with M5 socket screws so that the screws are centrally located

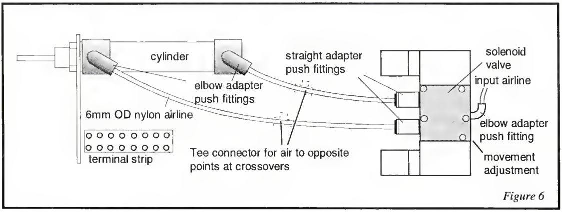


Figure 6

Point Motor and Pneumatic Parts List			
Item	**Name**	**Material**	**Qty.**
1.0	Main section	50x50mm 3mm wall RHS, 1250mm length	1
1.1	Solenoid bracket	50x50mmx3mm MS angle	1
1.2	Cylinder bracket	50x50x5 angle, 25x80x3 flat bar	1
1.3	Limit switch plate	38x5 MS flat bar M5 x 10 Socket head steel screws	2 2
1.4	Manual lock bracket - B	25x6 flat bar	1
1.5	Manual locking pin	12mm MS rod	1
1.6	Manual lock bracket - A	40x40x3 angle	1
1.7	Roller bracket	25x6 flat bar, 6mm OD stainless rod	3
1.8	Roller	40mm OD x 40mm Duralon or similar plastic M10 12x25 UNBRAKO® shoulder bolt	3 3
1.9	Solenoid valve	Master Mac®45A-GC2-DDAJ-IKD or similar	1
1.10	Air Cylinder	Master Mac® E-25-25-V Bimba with nut & clevis, or similar	1
1.11	Microswitch	Dick Smith catalog P7800 or similar M3 x 15 Phillips head plated brass screws	2 4
1.12	12 way Terminal strip cut to 8 way	Dick Smith catalog P4855 or similar M3 x 15 Phillips head plated brass screws	1 2
2.0	Actuator bar	25x6 flat bar, 810mm length	1
2.1	Point arm clevis	25x6 flat bar, 40mm length	2
2.2	Cylinder clevis bracket	40x40x3 angle, 20x8 flat bar	1
2.3	Limit switch actuator	16g Aluminium sheet	1
	Pneumatic tubing 6mm OD (4mm ID)	6mm OD Nylon airline tube to BS5409	as reqd
	Pneumatic tubing 10mm OD	10mm OD Nylon airline tube to BS5409 (distribution)	as reqd
	Straight adapter	Pneumatic 6mm OD push fitting	2
	Elbow adapter	Pneumatic 6mm OD push fitting	3
	Tee connector (where reqd.)	Pneumatic 6mm OD push fitting	2
	Tray & cover	16g Zincalume	

in the bracket slot. The limit switch actuator [2.3] can now be clamped to the actuator bar so that the extremes of actuator bar travel cause each microswitch to operate. Drill and screw the limit switch actuator [2.3] to the actuator bar and remove the clamp.

Drill two 6.5mm holes in the actuator bar using the manual lock bracket hole as a guide. One hole is drilled with the switch blade hard one way, and the other with the switch blade hard over the other way. The locking pin [1.5] is used through the hole should it be necessary to lock the point. While not in use the locking pin can be secured by chain touch welded to the pin and screwed to the RHS, with an adjacent clip to hold it.

Cover

A sheet metal tray and cover needs to be made to protect the workings from the weather and the ingress of dirt and leaves. The size and shape of this cover is left to the individual, but it should cover from the air cylinder clevis to about 3cm beyond the solenoid end of the RHS so that wires and airline entry to the motor can be neatly arranged. The photographs show a suitable cover.

While our covers have sharp edges, rounded or angled ones may be preferable for safety reasons. The cover is slightly larger than the tray so that it covers it, and self tapping screws can secure them together.

Plating and painting

After removing the Cylinder, Rollers, Dowels, Terminal strip and Solenoid valve, clean with thinners and apply protective coats of primer, undercoat and topcoat paint. For improved durability but for additional cost the motor can be zinc plated. The point motor shown in the photographs was plated but the coat of black paint applied after did not adhere well, hence the mottled appearance. Etch primer may solve this problem. The cover and tray can have a safety colour applied to help prevent accidents with pedestrians.

Air connection

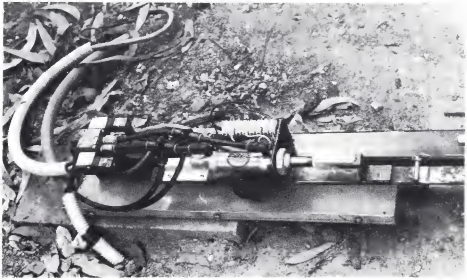
Secure the Cylinder, Rollers, Dowels, Terminal strip and Solenoid valve back in position.

The Solenoid valve air outlets are now connected to each end of the Cylinder with 6mm OD nylon airline and push type fittings as shown in Figure 6. If the track layout is a crossover with both points operating together, the second point motor will not require a solenoid valve as it can be driven via a tee-connector off the first solenoid. These tees, shown dotted in Figure 6, mean two lengths of 6mm OD airline are needed between the tee and the air cylinder on the other point motor. Connect the airline "polarity" correctly so that the two points are either both at main or both at crossover when switched.

Movement adjustment

The Solenoid valve has an air release valve adjustment so that the speed of the point operation can be controlled. With full air release the points whack over quickly with force and noise; with limited air release the point moves over slowly and quietly. Adjust to suit your needs.

Part 2 will continue with a description of the signal and electrical components of the design...



View from the cylinder side, showing cable entries.

Maritime Matters

with Leigh Adams

Minehunters underway

The Royal Australian Navy has placed an order with ADI (Australian Defence Industries) for six Coastal Minehunters to be named, *Huon, Hawkesbury, Norman, Gascoyne, Diamantina* and *Yarra*. To be built in Newcastle New South Wales and, like the real vessels, construction has started on scale models. So popular has this class been with modellers that no less than 10 are underway. John Carter from the Maritime Model Club of New South Wales Inc. has started a register for this class and invites anybody interested in building a model to contact him through the club, PO Box 1731, DEE WHY, NSW, 2099.

The fibreglass hull in 1/32 scale is available from APS Models. Length 1650mm O/A Beam 300mm O/A. Plans and associated components are available through the register. Some of the models are in the advanced stages of construction, with two having already tasted the waters. Like most naval craft, there is plenty of detail for the modeller to get stuck into and being built on this relatively large scale will make an impressive sight on the water. Members of the register anticipate that they will take anything from 12 to 24 months to complete their projects, depending on the complexity of the mechanics they decide to build into the model.

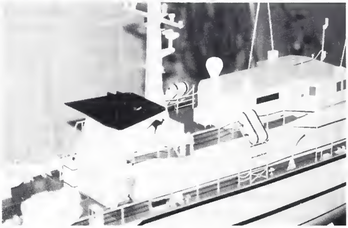
Main propulsion is a fine bladed propeller and steering from twin rudders, in addition there are three Kortz nozzles, two aft and one forward and if set up to operate, they will give the operator a handfull of controls to fiddle with.

We look forward to seeing plenty of launchings soon and a flotilla of minehunters combing the lakes.

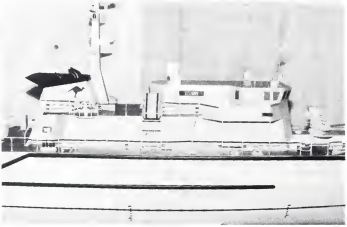
Are you a "closet" modeller?

I have the opportunity to travel to five model clubs in the Sydney metropolitan area. From these travels I meet a lot of the same

General view of the 1/32 scale RAN minehunter ***Huon****. The overall length is 1650mm*



A closer look at the funnel and upper decks. Note the outboard motor under the stairs.



Midships showing the bridge, funnel, chaff launcher below the kangaroo, and the life raft containers.

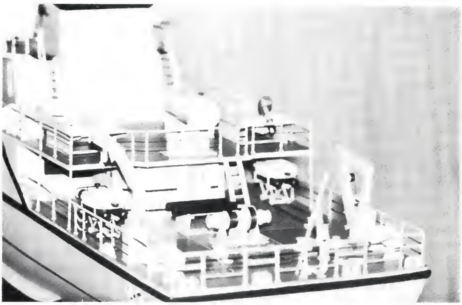
people and the same models with the occasional new model being launched. If you prefer to model on your own, perhaps you could show off your model/s through the pages of AME. The AME staff are only too willing to help out with writing, drawing or photos — or all three! Just let us know if we can help you in any way.

Maritime club directory

The end of this section contains a listing of the maritime clubs that we know about. If the details published are not correct, could you let AME know so it can be fixed for a future issue. If your club is not listed — especially the New Zealand modellers — could you please write or phone AME with your details. We have many casual readers who would consider visiting your club on a sailing day if they know when and where it is held.

We will endeavour to keep the directory up-to-date and reprint it from time to time. Some of these clubs have recently been contacted and they talk about very exciting things happening in the boating arena. Some have promised to send in some information for all to share in the fun and excitement of maritime modelling. How about sharing your ideas and skills with AME readers? I'm sure that many others would be interested in your efforts!

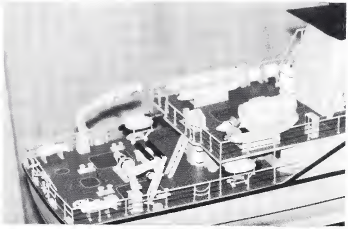
HMAS HUON



A closeup of the aft deck. The recompression chamber is on the upper deck between the inflatable life rafts.

A closeup of the port side. The three cylinders in the centre are life raft containers that automatically inflate once they hit the water.

The full model showing the variable pitch propeller, twin rudders and Kortz nozzles.



Two aft deck views with a closer look at the palfinger cranes, one opened and one closed. Also shown are the yellow double eagle submersibles which are operated by remote control to seek and destroy mines.

The bow features 30mm Bofors cannon, below the hull is the Kortz nozzle and the cable connected to the sonar equipment.

Maritime Readers

This section will grow and develop with your help. How about it?

Model Boat Club Directory — Australia and New Zealand

There are a few clubs missing from this list, we will update the list when the information is available

ACT Model Boat Club
Contact: Secretary; Patricia Price. **Phone:** (06) 258 8516
Postal address: PO Box 9043, Deakin, ACT, 2600
Sailing information: Sunday following the second Tuesday. 12.30pm to 4.30pm. Phone for venue information.

Hornsby and District Model Engineers Society Co-op Ltd.
Contact: Alan Fern (marine section) **Phone:** (02) 639 8173
Postal address: PO Box 172, Galston, NSW, 2159
Sailing Information: 2nd and 3rd Sundays at Fagan Park, Galston.

Lakewood Model Boat Club Inc.
Contact: President; Wilf Hinton. **Phone:** (07) 3808 1769
Postal address: PO Box 56, Browns Plains, Qld., 4118
Sailing information: Every Sunday, 9am to 1pm. and every Wednesday, 9am to 12 midday. At the Lakewood Estate, Nottingham St., Calamvale.

Maritime Model Club of NSW Inc.
Contact: Secretary; Geoff Eastwood. **Phone:** (02) 9948 2868 or (02) 9971 8461
Postal address: PO Box 1731, Dee Why, NSW, 2099
Sailing information:

Newcastle Marine Modellers Inc.
Contact: Secretary; David Price. **Phone:** (049) 43 2553
Postal address: PO Box 4, Jewellstown Plaza, Belmont North, NSW, 2280
Sailing information: Every Saturday afternoon, 1pm to 3pm, Blackbutt Reserve — entry off Feyburg St. There is a workshop most Tuesday evenings, contact the Secretary for details.

Rotorua Society of Model Engineers (NZ)
Contact: Secretary; Alan Sadler. **Phone:** (07) 348 8911
Postal address: Box 7108, TE Ngae, NZ.
Sailing Information: Contact the Secretary for details.

Sunshine Coast Modellers
Contact: Ashley Blades **Phone:** (074) 93 3684

Surrey Park Model Boat Club Inc.
Contact: President; John Johnston. **Phone:** (03) 9874 3682
Postal address: PO Box 36 Eastern Mail Centre, Nunawading, Vic., 3110
Sailing information: Every Sunday from 10am. Meet at the corner of Elgar and Canterbury Rds., Box Hill, (old Surrey Dive).
Twilight sailing every wednesday from 4pm.
Electric, steam and sail models welcome — No IC engines please.

St. George Model Boat Club Inc.
Contact: Treasurer; Randall Wooding. **Phone:** (02) 588 3739
Postal address: PO Box 322, Kogarah, NSW, 2217
Sailing information: Every Sunday, 10am to 4pm.
Scarborough Park, Barton St., Monterey.

Tauranga Model Marine and Engineering Club (Tauranga NZ)
Contact: Secretary; John Treloar
Postal address: 326A Devonport Rd. Taurunga, NZ.
Sailing information: Contact the Secretary for details.

Task Force 72
Contact: Secretary, Russ French. **Phone:** (02) 525 6135
Postal address: PO Box 840, Sutherland, NSW, 2232
Sailing information: Contact Secretary for details.

Tripple S Model Boat Group
Contact: Don Parsons **Phone:** (07) 3829 9006

Club Roundup

Wanganui NZ

The Wanganui Model Engineering Society has gone through a change. They are now combined with the Wanganui Model Railway Club to become the Wanganui Model Railway and Engineering Society Inc. Their newsletter, now appropriately called *Mixed Traffic*, reports that the new formation has introduced new blood to both groups with an increased interest from the younger members.

The progress of model engineering activities has been curtailed by constant wet weather. Hopefully Summer conditions will enable many outstanding projects to be completed.

Wanganui Model Railway and Engineering Society Inc.
Location: 70A Alma Rd.
Public running: Unknown

Hastings Vic

Members and five locos from the BHPWPMRS visited the South Western Model Engineers at Cobden during September 1995. The hospitality was as noteworthy as the track's performance. The new 5"g section was built in 18 months by 26 active members and was successfully tested for the first time by our members. Other additions to the Cobden track include a five road steaming bay, a 25 metre long tunnel and the lifting of the $3\frac{1}{2}$"g track. These new features, as well as the excellent facilities, will ensure that all who attend the 1997 convention will have a most interesting and hospitable Easter.

Additions to the Western Port club rooms have been completed during the Winter months under the Guidence of Kel Heath. Working bees were well attended with the attraction of the traditional club barbeques supplied by the lady members. The club rooms were officially opened on 18 November to coincide with the club's 21st birthday. The new facilities will be appreciated by the visitors who attend our all comers day on 2 March 1996, where the usual warm welcome awaits you all!

BHP Western Port Model Railway Society
Location: Denham Road, Hastings
(Melway 155 A)
No public running

Cobden Vic

The South Western Model Engineers is now under new management following the 1995 AGM. The new president is Kevin Molan and the new Secretary is Ian McArthur. Progress on the club's facilities is proceeding at a very satisfactory rate. New projects recently completed are: five new points, additional steaming bays, a traverser, several new riding cars, a new PA system and toilet block.

The $3\frac{1}{2}$"g track is being transformed from ground level to elevated. New concrete blocks are on site and are being prepared for the track replacement. All of these improvements are being undertaken to prepare the grounds for future events such as the 1997 convention.

South Western Model Engineers
Location: Grayland Street, Cobden, Victoria
Public running: 3rd Sunday of each month.

Millswood SA

The South Australian Society of Model & Experimental Engineers Inc. had a very busy 1995. Several new rules have been introduced to comply with the wishes of legislation associated with the Occupational Health and Safety Welfare Act (SA). Some modifications to facilities at the grounds include: the installation of new concrete picnic tables, new points to the turntable tracks, 5"g storage capability in the $7\frac{1}{4}$"g truck shed and a new passing loop and siding at the station. The station itself now has a roof covering the passenger loading/unloading areas.

South Australian Society of Model & Experimental Engineers Inc.
Location: Off Millswood Crescent,
Millswood, South Australia
Public running: 1st Sunday & 3rd Saturday of each month

Wellington NZ

Hutt Valley Model Engineering Society Inc.

Anyone on the information Super-railway can contact Charlie Lear on: hvmes@ibm.net

Charlie is the President of the Hutt Valley Model Engineers and welcomes contact through the electronic media.

In line with current trends, the Society has appointed a safety team to identify possible hazards and make recommendations for future safety standards.

Location: Marine Parade, Petone

Paraparaumu Associated Modellers Inc.

The track is now operational! The society welcomes members from other clubs to try out their 5" and $7\frac{1}{4}$" ground-level railway. For the information of prospective visitors, the track dimensions are as follows: Wheel back-to-back is $4\frac{11}{16}$" for 5"g and $6\frac{13}{16}$" for the $7\frac{1}{4}$"g. Make sure that your cowcatcher, brake gear, etc., is at least $\frac{3}{16}$" above the rail level. The adoption of an American system of having the check rails slightly avove the running rails has paid off as we have not had a derailment of a passenger trolley since — but a couple of locos have run into difficulties with their cowcatchers being too low! It would be appreciated if visitors could bring their own trollies as there are not enough to go around at present. If you would like to try out the track, give Owen a call on (04) 297 3080 to verify track availability.

Location: Marine Gardens Railway, Raumati Beach

Maidstone Model Engineering Society Inc.

The present elevated railway will be joined by a ground-level 5"g and $7\frac{1}{4}$"g railway currently in the planning stages. The new track will travel around the perimeter of the elevated track. The elevated track will not be left out, as it will undergo a major reconsrtuction to a superior standard. The track will be relaid on a continuous-cast concrete bed incorporating mowing strips at the foot. The new bed will follow the natural contours of the land more closely than the present track. This should provide a more interesting and challanging ride than the present table-top-like situation.

Location: Maidstone Park, Upper Hutt

Warner Qld

Pin painted pegs have been seen recently -- planted in the area of the spiral, just north of the station. Various members have been detected roaming around with theodolites and tape measures! It's all part of the society's adoption of good planning practices for the land at Warner. The society is now listed on the Pine Shire Council plan as a subdivision with a declared use as a Model Railway. While this is excellent for the society's future, it means that all future works have to be approved by Council. Many members have entered into the spirit of things by submitting sketches of possible alternative track layouts for discussion.

Queensland Society of Model & Experimental Engineers
Location: Lot 5, Warner Road, Warner,
Queensland
No public running.

Tauranga NZ

The Model Marine and Engineering Club of Tauranga will be the venue for the 1998 Expo, a committee has been formed to co-ordinate the event. His Worship the Mayor, Noel Pope, has agreed to become the club's Patron. The present water treatment programme seems to have improved locomotive performance.

The Model Marine and Engineering Club
Location: Memorial Park, Tauranga.
Public running day: Every Sunday.

Prospect SA

The August 1995 "special" SAR field day was one to be remembered! Perfect weather, a good crowd with plenty for them to see and do, many interesting static exhibits, several visitors from other local clubs and plenty of members on hand. The motive power was provided by a 3" scale traction engine and 13 locomotives! Two scale freight trains blended in well on the outer line, to compliment a busy set of passenger trains. The theme day worked well, giving the public a sense of "occasion" as well as providing members with a bit more interest in the club day. The ex-South Australian Railway prototype theme was especially interesting as the SAR had quite a rich selection of locomotives and rolling stock use as a modelling base.

Adelaide Miniature Steam Railway Society Inc.

Location: 370 Regency Road, Prospect, South Australia

Public running day: 4th Sunday of each month.

Eltham Vic

The Diamond Valley Railway Inc., reports that the new Meadmore Junction signal box constuction is slowly progressing. It is now at lock-up stage, the stairs have been erected, doors and window shutters have been installed.

Following the AGM held last August, the society has a new secretary, Brian Coleman. Jan Cottrell is now the Treasurer. Jim Wilcox remains as the society's president.

The Diamond Valley Railway Inc.

Location: Lower Eltham Park, Main Road, Eltham Victoria.

Public running day: Every Sunday

New Plymouth NZ

The NPSMEE have an interesting notion for a work day — "Dig a bit of bitumen for fun!" Apparently they did, and they had fun.

The plant mix that was used as ballast has now been removed and clean chips have been placed under the track to allow free drainage. The new ballast has also reduced the train noise, which has received approval from passengers as the trains travel from the tunnel through the underpass. More fun was experienced as volunteers dug a drain beneath the underpass!

New Plymouth Society of Model and Experimental Engineers Inc.

Location: Cnr Liardet and Gilbert Sts., New Plymouth, NZ.

Public running day: Every Sunday

Moorabbin Vic

The society visited the new Horsham Wool Factory extensions. The new work includes a 5"g and 7¼"g ground level track adjacent to the main complex. After the opening by a local member of Parliament, AALS Vic Branch President Murray Hill spoke to the crowd about the hobby and praised the people who built the wool factory track.

The Steam Locomotive Society of Victoria Inc.

Location: Rowans Rd, Moorabbin

Public running day: 1st Sunday of each month, except January.

Remaining New Zealand Clubs

Ashburton Steam and Model Engineering Club

Location: Ashburton, South Island

Auckland Society of Model Engineers Inc.

Location: Peterson Road Reserve, Waipuna Rd. Panmure, North Island

Canterbury Society of Model Engineers

Location: 26 Andrew Crescent, Christchurch, South Island

Gore Model Engineering Club Inc.

Location: Hamilton Park. Gore, South Island

Hamilton Model Engineers Inc.

Location: Minogue Park, 24 Tui Avenue, Forest Lake, Hamilton, North Island

Public running day: Every Sunday

Havelock North Live Steamers & Associates Inc.

Location: Keirunga Gardens, Pufflet Road Havelock North, North Island

Hawkes Bay Model Engineering Society Inc.

Location: Westshore Beach, Hastings, North Island

Manukau Live Steamers Inc.

Location: Mangere Centre Park, Robertson Road, Mangere, Auckland, North Island

Public running day: Every Sunday

Marlborough Society of Model Engineers

Location: Brayshaw Park, Blenheim, South Island

Nelson Society of Modellers Inc.

Location: adjacent to Tahunanui Beach, Walkare St. Nelson, South Island

Public running day: Every Sunday

Otago Model Engineers Society

Location: Kettle Park, Dunedin, South Island

Palmerston North Society of Model Engineers

Location: Mariner Park, Palmerston North, North Island

Picton Society of Model Engineers

Location: Foreshore, Picton, South Island

Rotorua Society of Model Engineers

Location: Te Amorangi Museum, Robertson Avenue, Holdens Bay, Rotorua, North Island

Public running day: 2nd Sunday

South Canterbury Model Engineers

Location: Anzac Square, Canterbury South, South Island

Southland Society of Model Engineers Inc.

Location: Surrey Park, Invercargill, South Island,

Thames Small Gauge Railway Society

Location: Thames Foreshore, Thames, North Island

Whangarei Model Engineering Club

Location: Tarewa Park, Whangarei, North Island

Coming Events

5 to 10 January
Steam Expo 96 - New Zealand

OtagoModel Engineering Society. Contact the Convenor, PO Box 2163 Dunedin 9030 New Zealand.

17, 18 February
AALS Victorian branch meeting at Cobden

All modellers are welcome to attend this special weekend. There will be some running available on Friday the 16th. The AALS meeting will be Saturday. Sunday is the Cobden regular running day. Location: Grayland Street, Cobden, Victoria

24, 25 February
Lake Macquarie Birthday Run

All model engineers are invited to the 4th Annual Birthday Run of the Lake Macquarie Live Steam Locomotive Society. Off Velinda St. Edgeworth, NSW.

2 March
BHPWPMRS All-comers Day

The usual warm welcome awaits you all at the BHP Western Port Model Railway Society's All-Comers Day. Come and join us at Denham Road, Hastings (Melway 155 A) for a great day. Contact Gerry Spoor, Private Bag 1, Hastings, Victoria, 3915, for details.

4 to 7 April
National AALS convention, Penfield SA.

Contact: Convention Secretary, Penfield Mdel Engineers Society, PO Box 792, Salisbury, SA, 5108. A reminder that registration forms for meals should be placed by 7 March.

17 to 21 April
Maitland Steam Fest

All Welcome!! Especially exhibitors of steam models of all types. This award winning festival features many facets of life around the steam era. If you can't exhibit, then come and look around.

Contact Bob Neal (049) 32 8507 or Terry O'Neill (049) 26 3808 for information about exhibiting or what's on.

Club Roundup contributions

AME is pleased to receive club newsletters for consideration in this section. Newsletters are often a good source of articles, which we appreciate all the more, but most of all they help us keep in touch.

It is often difficult to decide what to publish and what to leave out. and the task of selecting material for a wider audience takes a lot of time. Also, there is always the risk that AME will publish something that the club considers sensitive. Please help by sending a "press release" page with your newsletter, or highlight the items you think we could use. We'll give first preference to clubs that help us out this way... bmc

Gas Firing — Where Do We Stand?

for Marine Engines and Small Gauge Locomotives

by Paul Trevaskis

Lately, model engineers have been making references to using butane gas to fire marine and locomotive boilers, and there is confusion regarding the tanks to hold the gas. I contacted the Pressure Section of the NSW Work Cover Authority to find out just what is legal and what isn't.

The Australian standard

Australian Standard 3920.1 categorizes pressure vessels according to their hazard rating, which is measured in megaPascal-litres. This is worked out by multiplying the working pressure of the gas concerned in MegaPascals by the volume of the tank in litres. A result of less than 30 does not require a design approval.

The "relative" danger

Another important point is that butane is classified as a non-harmful gas. This may seem a strange statement. It is non-harmful in relation to say, chlorine or cyanide. A tank must of course be made to a proper standard of construction. The boilers are generally smaller than those needing AMBSC approval.

If the boilers and gas tanks are built to AMBSC standards they will be overbuilt for their size, so there should not be any problems.

As an experiment I put a miniature locomotive gas tank and burner on to the glowing red coals a big wood fire with the gas turned on and lit. For half a minute the burner raged as the tank heated up. Then the O-rings on the filling valve and the take off tap melted. This gave two yellow flames about 50mm high for another half minute or so — and that was it [*please do not imitate the above proceedure without strict safety precautions... bmc*].

Practical application

To give a working example. I have a 16mm scale locomotive running on butane; the burner is fed from a tank 30mm diameter and 50mm high; thus it holds 35ml or 0.035 litres and gives a run of about 15 minutes.

The pressure of butane at a temperature of 66°C is 627 kPa. or 0.627 MPa. I have chosen 66° to allow for the increase in temperature in the hull of a marine setup.

Thus 0.035 x 0.627 = 0.021945

This is well below the level needing design approval. There is not enough latent energy in such a small tank to be of any real danger. Remember that thousands of people walk around with cigarette lighters in their pockets without any problems.

Propane

The above figures apply to butane only. Propane has a much higher working pressure. For example, at 66°C propane exerts 2232 kPa. For the previous example 0.035 x 2232 = 0.07812, which is still well within the statutory limits, although 2232 kPa is over 300 lbs/sq in!

Even though there is a large calorific difference between butane and propane, in small applications such as these it would not make much difference to steam production. Building a small tank to handle the higher pressure of propane would not be worth the effort. Campgas is a butane mixture available that contains 10% propane. When the ambient temperature is below 5°C, straight butane does not have enough pressure to run the burner. The 10% propane overcomes this and solves the problems associated with tanks freezing, which makes re-fuelling difficult.

In conclusion

After nearly ten years of using gas to fire my locomotives, I have not had anything near an awkward situation. Even when derailed with the tank upside down, the burner gets a shot of liquid gas and burns a bit fiercer till the engine is righted.

When refilling the tank, caution is required to ensure there are no puddles of gas left lying around. Refilling should be done outdoors and from tanks with some sort of cut-off valve in the main tank.

The AME Under 25s Encouragement Award

Conditions of Entry

Younger model engineers are making great contribution to the hobby, even though they are often hampered by having less access to tools and resources than older model engineers. AME instigated this award in 1993 to encourage under 25s to show their talents; to engender a spirit of encouragement in more experienced model engineers; and in a small way to foster the growth of participation by people in the younger age range.

We've been pleased to hear that a number of under-25s have been spurred on to complete their models by the thought of participating in the award.

Last year's winner was Rodney Hague of the Townsville and District Society of Model Engineers — see AME issue 61 page 18 for details.

If you fit the age criteria, photocopy the entry form on the next page, post or fax it to AME and start a-fittin' and a-turnin'!

Age criteria

If you turn 25 in the 1996 calendar year or later, you are eligible. If you turned 25 in the 1995 calendar year or earlier you are not eligible.

Entries

May be any model or experimental engineering item or model. For example it can be a steam, diesel or electric outline locomotive; steam, internal combustion, electric, hot air and Stirling cycle, stationary or mobile plant or road vehicles; boats or ships with any form of power drive; marine plant; workshop equipment, jigs, fixtures and aids to manufacture; clocks and other horological or astronomical items; electronic, programmable logic, digital and analogue controls and monitoring of any of the above models—or any other item(s) which the judges consider relevant to model engineering.

Judging

The following is taken into consideration:

- The age of the entrant and skills relevant to age.
- The ambitiousness of the project.
- The workmanship of the project.
- The access to workshop facilities.
- The location to resources and materials.
- The formal skills of the entrant.

The above is intended to even out the playing field so that the judges may look at each entry "all things considered." The idea is that the thirteen year old student (with no formal mechanical skills) from the Back'O'Bourke who works in a tin shed with pistol drill, hacksaw, file and hand scraper to build a model of a ferris wheel has as much chance as the 25-year-old qualified thou-splitting toolmaker with a CNC workshop and limitless resources who has turned out a VR H class 4-8-4 with working stoker engine!

Have a go!

The presentation will take place at the AALS convention at Penfield this coming Easter. Entries will be received up to day one of the convention. The perpetual trophy will be awarded at the AALS presentation night on Sunday evening. A prize (to keep) relevant to the winner's interest in the hobby will also be presented.

So come on all you younger model engineers, let's see the tables with plenty of entries on them in Penfield this Easter!

Australian Model Engineering

Under 25s Encouragement Award

1996 Entry Form

Name . . . . Age . . . .

Address . . . .

. . . . Phone . . . .

Club or Society (if applicable). . . . .

Qualifications and/or occupation . . . .

. . . .

Brief description of entry . . . .

. . . .

. . . .

Approx. dimensions & weight . . . . (Enclose photo if possible)

Equipment used in construction (e.g. lathe, drill press, hand tools etc.) . . . .

. . . .

. . . .

Other information relating to the entry (eg. outline of construction and assistance had, if any)

. . . .

. . . .

. . . .

Australian Model Engineering undertakes that the privacy of entrants will be respected.

I hereby declare that:

1. I have personally constructed at least 75% of my entry.
2. I was under 25 years of age as at 31st December 1995.
3. I agree to the conditions of entry and that the judges decision will be final.
4. I agree to display the entry at the 1996 AALS convention site for the purposes of judging.

Signature . . . . Date . . . .

1996 AALS National Convention Update

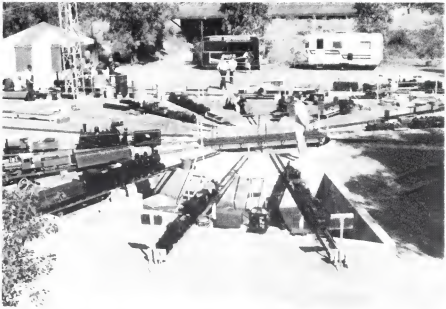
Once again, Easter plans are being made by model engineers around Australia to gather for the 40th annual Australian Association of Live Steamers convention, 4 to 8 April 1996. This will be the fourth convention hosted by the Penfield Model Engineers Society Inc.

Recent uncertainties about the future relocation of the society have slowed the preparations somewhat. The membership have, understandably, been reluctant to expend funds and undue effort on facilities that they may lose in the short term! The society relies soley on the field day income for its funding, besides membership dues. Nevertheless, the "Nullabor straight" has gone, being replaced by and "engineered" section. After all — anybody can lay straight track, but it takes an engineer to construct a curve!

The trackwork has the proven ability to handle the heavy trafffic of past conventions, so there is no doubt that it will do so once more. For those who have not experienced the Penfield spirit of hospitality, the society is located in the Adelaide suburb of Salisbury, 20 kilometres north of the city centre on about four acres of Department of Defence recreational reserve. The reserve also contains a half-acre boat pond and radio controlled car tracks. The Penfield model engineers have constructed 3500ft of 7¼"g and 5"g dual gauge ground level track, as well as 850ft of elevated 3½"g track. As usual, traction engines and other miniature road vehicles are encouraged to attend.

Full canteen facilities will be available. The Penfield tradition of providing top-quality meals at reasonable cost to delegates will be upheld — at Penfield conventions — no one goes hungry! However, to arrange catering, orders and payment for meals on the registration forms must be placed by 7 March 1996.

We look forward to your company in 1996 for some traditional South Australian good times! For further information contact the convention secretary: Penfield Model Engineers Society, PO Box 792, Salisbury, South Australia, 5108.



The ground level loco service facility during the 1987 convention at Penfield.

The elevated track loco service facility during the 1987 convention at Penfield.

Activities at the 1987 convention at Penfield.

Activities at the 1987 convention at Penfield.

High Current Switches for Model Locos

Inexpensive high current carrying switchgear

by Ian Strawbridge

If you have ever built or are contemplating building an electric or petrol electric locomotive then you may have already encountered the problem of trying to switch the power that your locomotive uses. In my own loco, which uses an alternator driven by a 4 Cycle 3.5 HP Briggs and Stratton engine, there are about 100 Amps available at up to about 30 Volts.

Finding appropriate switch gear to handle that sort of current either means using inadequate headlight relays, or similar in parallel, or a high priced commercial contactor. A contactor with contacts rated at 80-150 Amps will cost you some $230! Needless to say if you need several of these, then the cost of your project is going to balloon somewhat!

The circuit described is installed in the author's locomotive, EMD-1

An alternative

An effective, more easily obtainable unit is available from car wrecking yards! Even better still the cost will be somewhat more reasonable at around $10. (They are approximately $45 new.) The unit I have used is made by LUCAS and is the starter solenoid found on older Escorts, four-cylinder Torana's and Cortina's etc. Indeed, included in the price may well be some heavy duty battery/starter cable!

The particular unit is not on the starter motor but is used to switch the battery to the starter motor to start the car, and is usually mounted on one of the inner guards.

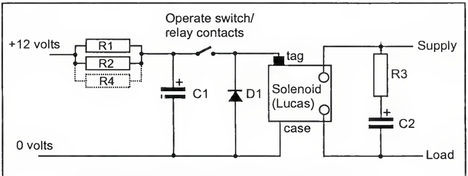
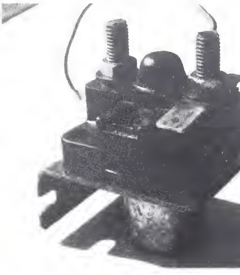


Figure 1: Circuit for using a starter solenoid

The fine print!

As you would expect, a car is not required to be turning its starter motor over on a continuous basis. The coils in these solenoids are about 3 ohms, which means on 12 Volts they will use some four Amps to operate.


A typical car starter solenoid as described

As you will appreciate they are not able to constantly have this amount of current flowing through them for long periods of time.

Read on to find out a solution to this problem!

Practical control methods

As already mentioned, the coil resistance is some 3 ohms and as result the power dissipated would be about 50 Watts. (picture a 50 Watt lamp and how hot they get and you have the idea) Ultimately the solenoid would overheat and fail. One way around this problem is to make use of the fact that, once operated, a solenoid (or relay for that matter) does not need as much current to hold it operated. In our particular instance:

Operate current	4 Amps
Hold current	0.65 Amp
Release current	0.5 Amps

In the Figure 1 circuit, the resistors R1 and R2 limit the maximum constant current through the solenoid to about 0.65 Amps. You may notice however that there is an electrolytic capacitor (C1) across the end of these resistors to the negative supply. This capacitor can supply short duration bursts of current and we make use of this when we close the operate switch, which could be another relay or switch.

Theory of operation

The majority of the operate current initially is supplied by C1 (having been charged to 12 Volts by R1 and R2) and the solenoid is kept operated after the capacitor has discharged by the current that continues to flow through R1 and R2. An important note! The capacitor C1 and diode D1 are polarised so please take care in the orientation of these components. D1 is used to remove the high voltage produced by the solenoid's back EMF when you first apply or remove the current to it. Without it your operate switch or relays won't live very long!

R1 and R2 (and R4 if required) will normally be reasonably warm to touch after continuous operation.

Continued on page 41

Finding Arc Dimensions by Computer

by Michael New

When building a model duplex water feed pump from castings supplied by Southworth Engines of Chesterfield UK, I considered the practicality of using PTFE precision balls rather than the specified manufactured valves.

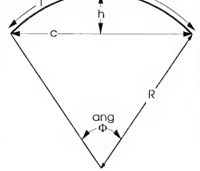
I needed to calculate the total depth of valve plates required to accommodate the balls, and this entailed figuring out how much the balls would drop vertically in a given diameter of feed hole. Space was tight if I were to use the existing bronze plates supplied.

It being a very hot Sunday afternoon, I thought that I would occupy my time inside writing this, in the event that some of your computer literate readers would find the program useful.

The calculations required the classic equations associated with the properties of an arc, and so often required in engineering - Radius of Arc, Cordal Length, Angle Subtended by Cord, Arc Length, and the important one: Height Subtended between Arc and Cord. (see Diagram)

During my time with a company supplying NC machines and a CAD/CAM package to the wood working industry, I was prompted to write a program in Basic to solve for all parameters given just two of them, the people in this industry not being too well gifted in the wonders of mathematics. It is also somewhat difficult to use a pair of compasses and a ruler on a computer screen, not to say how interesting things could be if you tried to centre-pop the point of interest to hold the compass in one place!

It is written in the Basic language and uses the exact equations rather than first order approximations for some of the solutions. The coding has been written so as to make it easy to understand by the enthusiast.



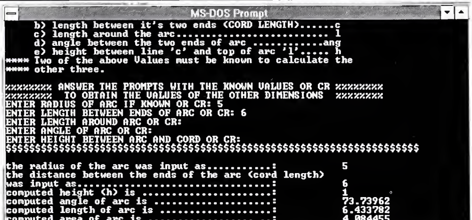
Editors' note: We asked AME's tame part-time programmer to help readers in putting this code to work. He added:

Using a word processor or the Windows Notepad program, type in the text and save it as an ASCII file with, say, the name *arc.txt.* Now start your computers' Basic program, and in trying this out we used Microsoft QBasic which comes with Windows when you buy your PC. In QBasic, select File, Open, and enter *arc.txt*; this loads your code into the screen. Now all you do is press key F5 or select *run* from the screen and up comes the program ready for you to start entering dimensions. Although the detail will change, this general procedure is used for other computers and Basic programs. The next step is to compile your code so that it can run as a stand-alone program (ie without using QBasic) but to do this you will need a more sophisticated Basic program such as Microsoft Visual Basic, and a description is beyond the scope of this note. (Product names identified are trademarks or registered trademarks of Microsoft Corp.)

```
REM "************************************************************
REM "****** this program written by mike new 4-2-93
REM "****** to provide solutions to the arc-radius cordal length
REM "****** equations for those people who are unfamiliar with
REM "****** the mathematics involved in the general solutions
REM "****** and who want to calculate the required values from
REM "****** data provided.
REM "************************************************************
REM
REM "  12/6/93   error traps added

REM "****** a) length of arc is l
REM "****** b) length of cord (distance between end points of arc) is c
REM "****** c) radius of arc is r
REM "****** d) distance h=cordal height between c and l
REM "****** e) alpha=angle subtended between ends of arc at circle centre.
REM
CLS
COLOR 15, 0' set up color of text and background;
PRINT "This program provides the user with all those solutions to the"
PRINT "often encountered problems concerning the relationship between"
PRINT "the two ends of an arc, it's length and height from the straight"
PRINT "line joining them and the angle subtended between the ends of the"
PRINT "arc at it's centre. "
PRINT "These gems of trigonometry which you thought you would never use"
PRINT "or have forgotten, will particularly assist those in engineering"
PRINT "and modelling where calculations involving the properties of an arc"
PRINT "are often required to be made."
PRINT "The parameters associated with an arc are:"
PRINT "     a) it's radius....................................r"
PRINT "     b) length between it's two ends (CORD LENGTH)......c"
PRINT "     c) length around the arc.......................... l"
PRINT "     d) angle between the two ends of arc ............ang"
PRINT "     e) height between line 'c' and top of arc 'l'..... h"
PRINT "**** Two of the above Values must be known to calculate the"
PRINT "**** other three."
PRINT
PRINT "- ANSWER THE PROMPTS WITH THE KNOWN VALUES OR C/R -"
PRINT "- TO OBTAIN THE VALUES OF THE OTHER DIMENSIONS -"
REM *********** set up constants here ********

INPUT "ENTER RADIUS OF ARC IF KNOWN OR CR: ", rad!
INPUT "ENTER LENGTH BETWEEN ENDS OF ARC OR CR: ", cee!
INPUT "ENTER LENGTH AROUND ARC OR CR: ", ll!
INPUT "ENTER ANGLE OF ARC OR CR: ", ang!
INPUT "ENTER HEIGHT BETWEEN ARC AND CORD OR CR: ", ht!
PRINT "$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$"
PRINT
IF rad! > 0 AND ht! > 0 THEN GOTO radht
IF cee! > 0 AND ht! > 0 THEN GOTO ceeht
IF rad! > 0 AND cee! > 0 THEN GOTO radcee
IF rad! > 0 AND ang! > 0 THEN GOTO radang
IF rad! > 0 AND ll! > 0 THEN GOTO llrad
IF cee! > 0 AND ang! > 0 THEN GOTO ceeang
IF ll! > 0 AND ang! > 0 THEN GOTO llang
IF ht! > 0 AND ang! > 0 THEN GOTO htang
REM " the following two combinations have not been implemented:--
IF ht! > 0 AND ll! > 0 THEN GOTO htll
IF cee! > 0 AND ll! > 0 THEN GOTO ceell

REM " ********************************************************
REM " start computing things here "
REM " ********************************************************

CONST pi! = 3.1416
CONST radcnv! = (2 * pi!) / 360
CONST degcnv! = 360 / (2 * pi)
REM ****************************************

REM "given radius and cordal length "
radcee:
IF cee! >= (2 * rad!) GOTO error1
radsqr! = (rad! * rad!)
ceesqr! = (cee! * cee!)
cht! = rad! - .5 * (SOR(4 * radsqr - ceesqr))
anglea! = cee! / (SOR(4 * radsqr! - ceesqr!))
cangle! = 2 * degcnv * ATN(anglea!)
cll! = .01745 * rad! * cangle!
carea! = .5 * ((rad! * cll!) - (cee! * (rad! - cht!)))

PRINT "the radius of the arc was input as...........: ", rad!
PRINT "the distance between the ends of the arc (cord length)"
PRINT "was input as................................: ", cee!
PRINT "computed height (h) is ......................: ", cht!
PRINT "computed angle of arc is ....................: ", cangle!
PRINT "computed length of arc is ...................: ", cll!
PRINT "computed area of arc is .....................: ", carea!
GOTO enda

error1:
PRINT " the given cord length is equal to, or greater than the arc diameter"
PRINT " the other values cannot be computed try again."
GOTO enda
```

```
REM "given radius and cordal height"
radht:
IF ht! >= rad! GOTO error2
radsqr! = (rad! * rad!)
cee! = 2 * (SQR(ht! * (2 * rad! - ht!)))
cang! = 2 * degcnv! * ATN(cee! / (2 * (rad! - ht!)))
cll! = (rad! * cang!) / 57.296

PRINT "the radius of arc was input as ..............: ", rad!
PRINT "the height of arc was input as ..............: ", ht!
PRINT "the computed distance between ends of arc is : ", cee!
PRINT "the computed angle between end of arc is ....: ", cang!
PRINT "the computed arc length (l) is ...... .......: ", cll!
GOTO enda
error2:
PRINT "the given cord height is greater that the radius the "
PRINT "other values cannot be computed try again."
GOTO enda

REM "given radius and subtended angle."
radang:
IF ang! >= 180 GOTO error3
angrad! = radcnv! * ang
cll! = .01745 * rad! * ang!
cht! = rad! * (1 - COS(angrad / 2))
cee! = 2 * (SQR(cht! * (2 * rad! - cht!)))

PRINT "the radius of the arc was input as ...........: ", rad!
PRINT "the angle of arc was input as ................: ", ang!
PRINT "the computed distance between ends of arc is : ", cee!
PRINT "the computed height (h) is ..................: ", cht!
PRINT "the computed length of arc (l) is ...........: ", cll!
GOTO enda
error3:
PRINT " the given angle is greater than 180 deg. therefor the "
PRINT " other values cannot be computed. try again."
GOTO enda

REM " given cord length and subtended angle "
ceeang:
IF ang! >= 180 GOTO error3
angrad! = radcnv! * ang!
crad! = cee! / (2 * (SIN(angrad! / 2)))
cht! = crad! * (1 - COS(angrad! / 2))
cll! = (ang! * crad!) / 57.296

PRINT "the cord length (c) was input as ............: ", cee!
PRINT "the angle between ends of required arc is ...: ", ang!
PRINT "the computed radius of arc (r) is ...........: ", crad!
PRINT "the computed cordal height (h) is ...........: ", cht!
PRINT "the computed length around arc (l) is .......: ", cll!
GOTO enda

REM "given arc length and subtended angle"
llang:
IF ang! = >180 GOTO error3
angrad! = radcnv! * ang!
crad! = (57.296 * ll!) / ang!
ccee! = 2 * crad! * SIN(angrad / 2)
cht! = crad! * (1 - COS(angrad! / 2))

PRINT " the length of arc was input as ................: ", ll!
PRINT " the angle of arc was input as .................: ", ang!
PRINT " the computed radius of arc (r) is .............: ", crad!
PRINT " the computed cordal length (c) is ............: ", ccee!
PRINT " the computed cord height (h) is ...............: ", cht!
GOTO enda

REM "given arc length and radius "
llrad:
IF ll! > (pi * rad!) GOTO error6
cang! = 57.296 * ll! / rad!
angrad! = radcnv! * cang!
cht! = rad! * (1 - COS(angrad / 2))
cee! = 2 * (SQR(cht! * (2 * rad! - cht!)))

PRINT " the length of arc (l) was input as .............: ", ll!
PRINT "the radius (r) as input as ....................: ", rad!
PRINT "the computed angle between ends of arc is .....: ", cang!
PRINT "the computed cordal height (h) is .............: ", cht!
PRINT "the computed cordal length (c) is .............: ", cee!
GOTO enda

error6:
PRINT " the arc length given exceeds half the circumference try again "
GOTO enda

REM " given cord length and height"
ceeht:
IF ht! >= (cee! / 2) GOTO error4
ceesqr! = (cee! * cee!)
htsqr! = (ht! * ht!)
crad! = (ceesqr! + (4 * htsqr!)) / (8 * ht!)
cradsqr! = (crad! * crad!)
anglea! = cee! / (SQR(4 * cradsqr! - ceesqr!))
cangle! = 2 * degcnv * ATN(anglea!)
cll! = (.01745 * crad! * cangle!)

PRINT " Length of cord (distance between ends of arc"
PRINT " was input as .............................: ", cee!
PRINT " height of arc above cord was input as.....: ", ht!
PRINT " the computed radius of required arc is...: ", crad!
PRINT " the computed angle of arc is ............: ", cangle!
PRINT " the computed length of arc is ...........: ", cll!
GOTO enda

error4:
PRINT " the given cord height is greater than (cord_length/2)"
PRINT " the other values cannot be computed. try again."
GOTO enda


REM " given ht and angle"
htang:
IF ang! >= 180 GOTO error3
angrad! = radcnv! * ang!
crad! = ht! / (1 - COS(angrad! / 2))
cee! = 2 * (SQR(ht! * (2 * crad! - ht!)))
cll = (ang! * crad!) / 57.296

PRINT "height of cord was input as .........................: ", ht!
PRINT "angle between ends of required arc was input as .... : ", ang!
PRINT "the computed radius of arc is .......................: ", crad!
PRINT "the computed arc length is ..........................: ", cll!
PRINT "the computed cord length is .........................: ", cee!
GOTO enda

ceell:
PRINT "Equations for these parameters not implemented."
PRINT "Did not think that you would require a solution to this"
PRINT "combination."
GOTO enda

htll:
PRINT "Equations for these parameters not implemented."
PRINT "Did not think that you would require a solution to this"
PRINT "combination."

enda:
```

If you prefer a copy of the programme without the bother of typing it. Send a disk (any IBM type) with a stamped, self addressed envelope to AME. We'll return your disk with the programme loaded ready to run. Please allow 14 days for postage.



With QBASIC being run from within 'MS-DOS Prompt', this is a view of the screen when the program was run and radius 5, cord length 'c' 6, entered. Keep all dimensions in the same units ie. inches, cm, mm. CR is Carriage

Steam Chest

with Dave Harper

Hi there steam fans! Welcome to another helping of steam talk. More good feedback recently: this time, very quick responses to the request for information on the Sirius-Alco generating set.

Firstly, John Cummings of NSW contacted me to say that his wife, who is Dutch, had offered to translate the material that David Brownsey had. This has been sent on and we await results. Then came a package all the way from a gentleman in Sussex, England, containing copies of the articles from *Model Engineer* in 1990 on the Alco set. These were gratefully received by David before I noted the sender's name! However, I've no doubt that David will have replied by now. Thanks to both respondents for their help.

A recent visitor to the boiler house at Petrie was Matthew Churchward, curator of engineering and transport at the Scienceworks Museum, Melbourne. Matthew was known to me as co-author of the excellent book *Victorian Steam Power* — he duly signed my copy!

We had a great gabfest while showing Matthew around the boiler house, but the relevant news didn't surface until later, when I looked at some information sheets that Matthew had left me on various items in the Scienceworks.

One of these sheets described the Austral Otis pumping engines from the Spotswood Pumping Station in Melbourne. These engines were part of the sewage pumping works for Melbourne and appear to be locally built copies of the Hawthorn Davey engines at Umberumberka, featured in last issue.

The Austral Otis engines appear to be bigger, with bores of 20, 36 and 54 inches and a stroke of 42 inches — and also older, being built in 1911 and 1914 compared to 1920 for the Umberumberka engines. Otherwise it appears they are very similar, and the Spotswood ones are much easier to get to!

Another simple marine engine

Another welcome visitor was David Frood of Queensland, who phoned me first about the Simple Marine Engine by Bill Carter from the Sep-Oct '95 issue of AME.

David had picked up several mistakes in the drawings of the engine, which were corrected in the Nov-Dec '95 issue. However, the errors once detected were easily corrected, and David brought his completed engine out to the Boiler House where we were able to run it on compressed air. It really is a neat little unit, and runs on just a whisper of air. As David put it, "An ideal engine for us oldies to make; not much material required and you can take your time over it".

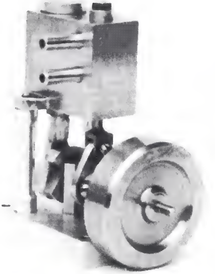
What a bottler!

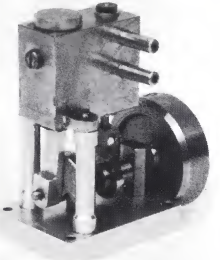
Finally, I managed to get over to Graham Chapman's paddock recently and get some more photos of the amazing collection of steam engines he has. Particularly I wanted to see the bottle engine that Terry Paton had told me about (refer Steam Chest Aug-Sep '95.)

The photo shows not one, but two bottle engines; the bigger one is by Walkers, the other one is a mystery with no maker's plates at all. What's more, the flywheel appears to be a turned-down railway wagon wheel, which points to a very interesting history, if only we knew what it was!

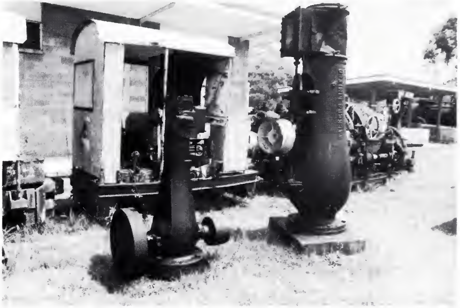
The unusual shape of the bottle engine is clear. It provided a very simple, strong and compact engine for the myriad users around the turn of the century.

The next photo shows the more usual English type of inverted vertical engine with the flared base which I originally took to be a bottle engine. It is a Marshall M Series engine





The two photos above show David Frood's Simple Marine Engine made from the article in the Sep-Oct '95 issue of AME.



Not one, but two bottle engines: the bigger one is by Walkers, the other one is a mystery with no maker's plates at all.

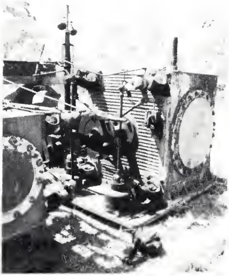
from the famous English builder. Also in the photo is a large two-drum steam winch, made by Ruwolt of Melbourne.

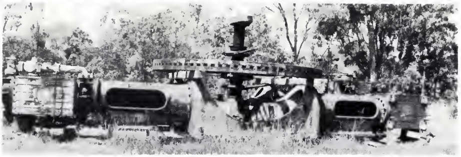
Corliss valve geared ammonia compressor

Among the many other engines scattered about the place, I had previously seen a huge cross-compound ammonia compressor which Graham had told me was from a now closed abattoir in Brisbane. As can be seen in the photo, the compressor pistons are driven directly from the steam piston rods, with the crankshaft and flywheel in the centre just to keep things running sweetly. The flywheel, now lying on top, must be a good 15ft diameter, which gives you some idea of the scale of the beast!

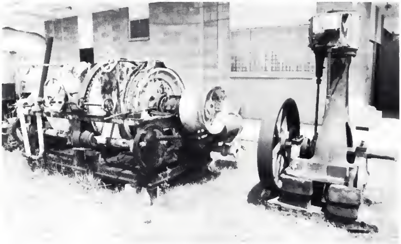
It was only when I wandered around the end of the steam cylinders that I discovered it has Corliss valve gear. This was a great thrill for me, as it's the first, and so far only, example of Corliss gear I've seen. I smartly clambered up and took some photos to show you, and was pleased to find the governor and all the wrist plates and trip gear in situ, although very rusty.

The low pressure cylinder appears to be about 3ft diameter. The HP around 20 inches. The ribbed cylinder casing is intriguing, likewise the forged ends of the eccentric rods that operate the wrist plates — made to look like spears, almost.

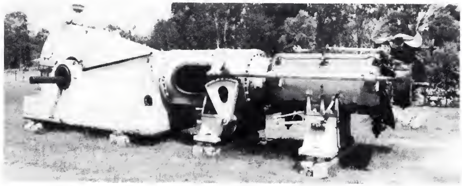




These three photos show the cross-compound ammonia compressor in the Chapman yard. The top two photos show a closer view of the end cylinders and the Corliss valve gear.



***Right:** a Marshall M Series engine. **Left:** a large two-drum steam winch, made by Ruwolt of Melbourne.*



The very last mill engine built by Walkers in Maryborough in 1960.

Graham told me that this is one of only two of these machines ever made — in the USA apparently, though I couldn't see any maker's name anywhere. It would certainly make an impressive model!

Walker's last mill engine

Finally, a recent arrival in the Chapman yard is the very last mill engine built by Walkers in Maryborough in 1960. It was removed from the Maryborough Sugar Mill last year, leaving just the one engine featured in Maryborough Odyssey last issue. The photo shows the enclosed crank, huge trunk crosshead guide and the worm and quadrant control for the Stephenson's link valve gear.

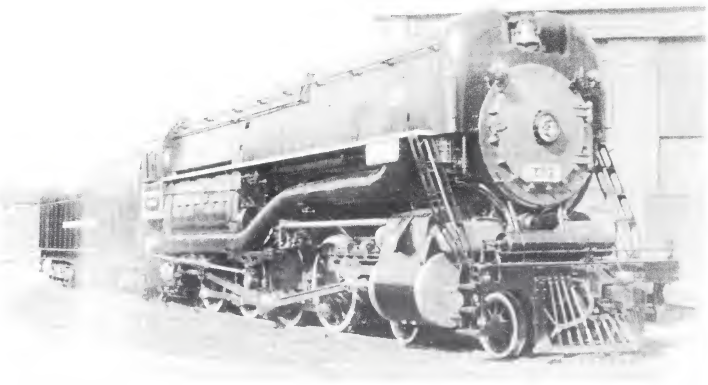
The air cleaner on top of the crankcase puzzled me: I thought there might have been a little petrol barring engine hidden in there or something! However, it appears it is purely a filter for the air entering the casing. Having seen the air in a working sugar mill, I can understand the desire to keep it away from the bearings!

Graham told me that when he clinched the deal to buy the engine, the mill engineer presented him with a huge roll containing all the original drawings of the engine! I've asked if I could have a look at them; the problem will be finding enough floor space to open them out! Who'd like the job of reducing them to 1/4 scale for a model project?

That's about it for this time; must dig up stuff on marine cross-heads for next issue. Till then, happy steaming!

World's Most Efficient Reciprocating Steam Locomotive

by Jim Tennant



*Delaware and Hudson 4-8-0 Class E-7 four cylinder triple compound locomotive '**E F Loree**'*

The above photograph (No S1727 ALCO Historic Photographs) shows the Delaware and Hudson 4-8-0 Class E-7 No 1403 (ALCO 1933) *E F Loree* four cylinder triple expansion compound locomotive that had reportedly achieved a maximum of 10.4% net efficiency.

Background

An argument that is always used against the steam locomotive compared with other forms of motive power is its net efficiency. Net efficiency is determined by estimating the potential energy available from a measured fuel type and the actual energy produced at the locomotive tender drawbar.

At the time No 1403 was built thermal efficiency of an ordinary steam locomotive was about 5.50 to 6.00 per cent[1]. Theoretically it was possible to increase this figure to 17.00 or 18.00 per cent. To approach more nearly this degree of efficiency was the goal of the Delaware and Hudson management, and the reason for its continued experimentation along these lines.

An article[1] eloquently expressed "Possessed of the Brute strength of a Mallet, yet with a modest appetite for coal and water, Delaware and Hudson locomotive No 1403 stands forth as 'something new under the sun'".[2]

Technical

This locomotive was preceded by a series of two cylinder compound 2-8-0 double expansion locomotives with consecutive increases in boiler pressure from 350 and 400 to 500 lbs per sq in. Each locomotive had a water tube firebox to withstand these boiler pressures which were very high for the steam locomotive boiler technology available at that period. The ultimate 500 lbs per sq in pressure appears to be one of the highest ever on a reciprocating steam locomotive although much higher pressures were incorporated in enclosed cycle boiler systems and "Fireless" boiler systems.

The boiler comprised 260" x 2.5" and 6" x 3" water tubes with 155" x 2" and 52" x 5.5" flues. Combined heating surface area was 4,427 sq ins and the superheater heating surface area was 1,076 sq ins.

The philosophy behind the wheel arrangement was to be able to achieve the maximum power and maximum tractive effort from the least number of driving axles, although it was found necessary to have a two axle leading bogie due to the weight of the front cylinders. The No 1403 had four cylinders, one located at each corner of the machine, the pairs on either side being connected through individual pistons, crossheads and driving rods, to a single main crank pin.

Steam at 500 pounds per sq in passed through a superheater to the high pressure cylinder, located below the cab on the right side, the steam then passing to the intermediate pressure cylinder which was below the cab on the left side. After intermediate expansion the steam pressure had been so reduced that two 33" low pressure cylinders were required at the front end.

Poppet valves

The poppet valves were actuated by a rotary cam gear. This arrangement lent itself more efficiently to the triple expansion requirements, in the correlating of the movements of the valves of the four cylinders. The rotary drive was obtained by means of cranks secured to the main pins and as was applied to No 1403, the free end of each crank was set exactly in line with the centre of the main axle, thereby producing the rotary motion nec-

Class	Cylinder x Stroke	Coupled Wheel Diameter (ft ins)	Boiler Pressure	Tractive effort @100% (lbs)	Grate Area (sq ft)	Heating Surface (sq ft)	Total Weight (tons)
E-7	HP 20x32	60.25	500	100,000 +14,000	75.80	4,427 +1076	173.60
	IP 27.5x32						
	LP (2) 33x32						

Table 1: Leading dimensions of the 4-8-0 prototype

Cylinder x Stroke (mm)	Coupled Wheel Diameter (mm)	Boiler Pressure ($kg\ cm^2$)	Tractive effort @100% (kgf)	Total Weight (tonnes)
HP 477x736.60	1,524	60	60,000 +5,000	146.40
IP 686x736.60				
LP 1024x736.60				

Table 2: Leading dimensions of the proposed 2-10-0 prototype

essary for the valve cam shaft operation. All valves were primarily actuated by the rotation of a single shaft. Each movement of the valves in the high pressure cylinder were attended by a definite predetermined movement of the valves in the other cylinders, thereby securing proper correlation of the work in the different cylinders.

As the Delaware and Hudson was the first railway to apply roller bearings to the main driving axle of a locomotive, this type was adopted for the No 1403.

Mounted below the left running board was a Dabeg mechanical feed water heater pump, driven from the crosshead, which supplies the boiler. A specially designed injector, which operated against any pressure of steam from 100 lbs per sq in to 500 lbs per sq in mounted below the cab on the right side as an auxiliary water supply.

Lubrication was supplied by a 26 feed mechanical lubricator, supplemented by a hydrostatic lubricator which supplied the auxiliaries.

Table 1 illustrates some leading dimensions of No 1403.

In conformity with the Delaware and Hudson practise of concealing the piping and various auxiliary units beneath the jacket of the boiler, aesthetically the locomotive set a precedent for contemporary steam developments and was in line with practical considerations of a modern steam locomotive, being inherently streamlined and consequently easily maintained.

The capacity of the tender was a further indication of the expected efficiency of the locomotive. It carried 14,000 gallons of water and 17.50 tons of coal, which, while in themselves substantial, were only two thirds of what was provided for a conventional locomotive operating the same service. The tender acted as a booster locomotive, the rear truck was a Bethlehem Auxiliary Locomotive in which a pair of cylinders, using 500 pound per sq in steam direct from the boiler, drives, through gears and rods, the three axles of the truck.

Literature is scarce about this locomotive however there are several additional references available.[3]

A general arrangement print of No 1403 - No SE1727 is available from ALCO Historical Photographs.

Contemporary considerations

Compound triple expansion is still considered as the possible norm for future steam locomotives by Señor Livio Dante Porta. His 1987 Mexican paper included an outline of a three cylinder 2-10-0 version designed to the North American loading gauge.[4]

Señor Porta has written that this proposal would be as powerful as a historic North American articulated steam locomotive and be able to run at 80 mph.[5] The outline shows that a steam driven, three cylinder, triple expansion hydraulic tender booster was also considered.

Table 2 illustrates some dimensions of Señor Porta's proposed 2-10-0.

References

1 'First in the World' The Delaware and Hudson Railroad Bulletin May 1 1933 pp69-73, p78.

2 op cit p69

3 (a) Train Shed Cyclopaedias N K Gregg USA No14 p1938, No23 pp246-247

(b) Robert Tufnell The Illustrated Encyclopaedia of Railway Locomotives New Burlington London 1987 p49, p128

(c) Rolf Ostendorf Ungerwohnliche Dampflokomotiven Motorbuch Verlag Stuttgart 1978 pp64-65, p284

(d) D R Carling 4-8-0 Tender Locomotives David and Charles UK pp26-28, Table 111 pp96-97

4 Señor L D Porta The Contribution of a New Steam Locomotive Power to an Oilless World Mexico 1987

5 Señor L D Porta private correspondence 11/01/80

❷ Parting Off

Shop Hints of Peter Dawes

Never use a straight parting tool on the front of a difficult job in tough steel. Use only the goose-neck tool there. If it is a rear mounted tool, use only the straight parting tool (upside down).

The reason

I think the articles in the overseas model press in recent times have totally missed the point about parting off. I am indebted to Jim Price of Orange for pointing out that the reason the rear-mounted Myford parts off without digging in is to do with resultant forces. Because of the way it cuts at the back. If it starts to dig in, the tool mounting yields in a direction such that the tool point is forced *up* and *out* of the cut.

There is a "virtual hinge point" about which any tool tends to deflect under load. This point is somewhere near the bottom of the toolpost. It is not easy to define and it varies with the lathe and in the same lathe from time to time, depending on the tightness of the slides and overhang of the tool. With a goose-neck parting tool, the virtual hinge point is transferred to a real fixed point at the top of the neck and this is the secret of its success.

Guide line

In essence, for no dig in, the line joining the tool tip and the virtual hinge point must pass:

- **Below** the line between centres when the tool is **front** mounted.
- **Above** the line between centres when the tool is **rear** mounted.

Angling the tool down, for example, is irrelevant unless a high virtual hinge point is introduced accidentally in the process. Angling it makes sharpening difficult, although it does allow the cutting edge height to be adjusted independently and that cannot be done with a horizontal toolbit. However, I think it is easier just to pack the holder up.

We are taught never to mount a tool in the horizontal plane in a toolpost such that if it slips, it will be forced deeper into the cut. We position it so that it is forced *out* of the cut. So why do we overlook that the same principle applies in the vertical plane too — if not more so?

When this tool digs in, it tends to dig even deeper because the virtual point of hinging or "give" in the tool mount is somewhere below the job.

Goose-neck tool holder

Now contrast this with the goose-neck tool in front, Fig 1. (Using a goose-neck tool in a rear mount would actually make the problem worse). As long as the the "hinge" on the goose-neck is above the centre height of the job, any tendency to dig in will cause it to bend *down* and *away* from the cut!

However, it is important that the virtual hinge *is* actually in the goose-neck because if the point of *least stiffness* is not in the goose-neck but in the natural virtual hinge, then the tool will still dig in. If this happens, tighten up the toolpost and slides and then perhaps even grind a little bit off the top of the goose-neck to free it up — but be careful!

It is clear if you think about it that the goose-neck stiffness has to be tailored somewhat to the load on the tool, which in turn depends on the width of the toolbit and the toughness of the material.

For example, if the tool is 1/8" wide cutting in tough steel it needs more force to push it into the cut and therefore the goose-neck needs to be stiffer than if it was 3/32" wide in free cutting steel.

Therefore if the goose-neck hinge needs to be stiffer than the resistance at the natural virtual hinge then parting will be unsuccessful and the tool subject to dig in. You must either use a narrower blade or a heavier lathe.

When cutting softer materials or when using a narrower blade, the goose-neck stiffness can, and should be, freer, in order to increase the margin of safety against dig-in. Clearly, it is not possible to have a goose-neck that is ideal for all conditions.

I have found that the Rimet goose-neck parting tool works very well in both a 4 1/2" South Bend clone and a 6" Taiwanese lathe (cost is about A$32 plus sales tax). It has transformed my parting off from a nightmare to a delight. It parts free cutting steel and bronze with ease and safety. It starts to have difficulty with tough steels, not because it digs in, but because it cannot press hard enough to make the cut. A bigger version may be the answer here, and then it is likely that only the 6" lathe would be able to handle it.

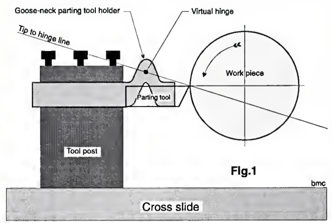


Fig.1 Goose-neck holder: this is okay

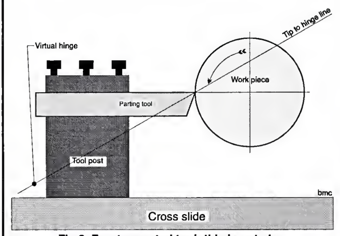


Fig.2 Front mounted tool: this is not okay

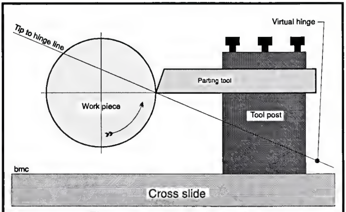


Fig.3 Rear mount: this is okay

Bandosaurus — A Homemade Bandsaw

by Warwick Cuneo

Drawings and photos by the author

With the dubious benefit of hindsight, here is not much justification for building a bandsaw, when quite adequate machines can be had for less than $600. Probably, too, they may be better featured. However, at the time, the exchequer being as it was, I simply did not have still don't have and am not likely to have, $600 or any other lump sum to spare. So what follows is definitely not cost-effective.

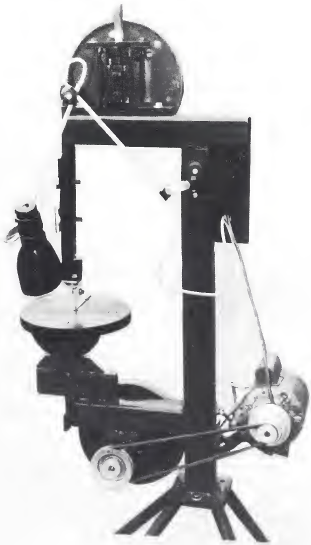
This article is not the blow-by-blow description so indulged in the English magazines, nor does its subject break new design ground. It borrows fairly freely from a Taiwanese metal-chopper of mine and from another woodworking machine branded Paulcall. The treasury dictated that it also be feasible from materials commonly available, if not from the hardware store, then one of the less exotic steel merchants. Making do with the common-or-garden variety, with liberal dashes of the ol' scrap bin. Perhaps, too some design improvements have crept in!

In my daily business, I have a requirement for cut-out lettering: You know, the stuff stuck on the outside of buildings, made of acrylic plastic, aluminium and occasionally even brass. There are of course better ways to cut lettering than with a bandsaw, but exotic technology is well out of reach.

The wood variety (Paulcall) bandsaw runs a bit too fast for any type of metal and the blade guidance system employed was a bit too agricultural even for me. On the other hand, the metal-chopper was too slow and the blade too wide to allow the intricate corners in some lettering and aluminium chips upset it. However, the metal chopper's blade guidance system of two clusters of three ball bearings (upper and lower) has been adopted and made more positive.

Both have pretty competent blade tensioning and alignment systems at the pulleys and my personal dinosaur borrows from both, with the prime consideration that the tensioner be effective and quick and easy to use. The secret of longevity in bandsaw blades is to release the tension whenever the machine is idle, so it behoves the builder's wallet to make the tensioner ergonomically sound.

The table angle adjustment mechanism is a bit of a pain to make and really bears close scrutiny as to whether it's really necessary at all. It is, however, fairly original and, dare I say it, an improvement on the wood machine system. It allows the lower guides to be set much closer to the table underside than is often the case, with the table flat or angled.



Bandosaurus — the guards have been temporarily removed to show the detail.

The frame is fabricated from 76mm square, 6.35mm wall RHS, a commonly available steelyard stock item. It allows plenty of flat areas for mounting of various components. The wall thickness is sufficient to allow tapping and good size weld beads are the norm. The pictures will show that the frame is little more than three lumps of RHS and some 6.35mm plate gussetting, welded to a 10mm plate base. The motor (375W) is mounted per a car door hinge-style pivot, on the frame and this allows the unit to be bolted to a bench or mounted on a dedicated stand, as mine is.

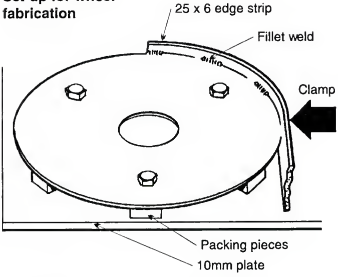
All this assumes that you may consider a beast of dimensions similar to mine. Mine became the size it is for two reasons:

- 1. Making a smaller one may have been a bit less work, but that's not to say that one half the size is half the work and;
- 2. Existing turning capacity allows about 315mm in the gap, so 300mm wheels were possible, with a bit of trick tooling. The wheel diameter dictated the throat size and this, in turn, mandated other sizes. Why not make a smaller one anyway? Nevertheless, I don't think there'd be much call for a band larger than the subject. It stands 1800mm on its four legs and needs a floor area of around 1 square meter. A fairly substantial animal, not given to cramped corners. A three-wheeler was considered and shelved as being a bit too complicated. Another element in the alignment process was simply another thing to go wrong.

The frame — in a bit more detail

The frame is arc-welded and probably needs the maximum amperage normally available from household current to ensure proper penetration. It could be rivetted and bolted and it is simple enough and thereby cheap enough to have fabricated "outside", although this is a bit against my grain. In any event, squareness should not be compromised, although the legs could be set a smidgen over 90 degrees to allow any (unlikely) flex in the column.

Set-up for wheel fabrication



The wheels

Ah! — the wheels. I began a pair made from cast-iron barbels and messed them up. The next try was better, although I hadn't much faith in my "theory", of using some 6.35mm plate circles, scrap from some job or other, with a rim of 6.35mm bar welded on. The expected distortion did not result, much to my surprise.

As might be expected, the success of the wheel manufacture depends, as in most welding, upon thorough and substantial attention to the clamping. Personally, I use a hand-held shield when welding: this I had, in the early stages, thought to be something of a nuisance, so I bought a head-mounted variety, with the object of freeing up the other hand. This it did, with the side effect of making the spare hand available for some nasty burns.

The hand-held shield gets the spare hand *away* from the work and dictates that the setup be self-supporting while clamped. Better work invariably results, although one seems to spend half an hour clamping for two minutes welding.

The sketch opposite should go a small distance towards clarifying the process of packing the disc up to a height to enable the rim piece to be clamped so it projects evenly on both side of the disc. Once the extreme end of the rim is sufficiently well clamped, place a moderate bead in the fillet. Make sure that the rim piece is aligned. It would be a bit disappointing to wind up with the other end not meeting, i.e., skewered in relation to the other. Again, this gets back to thorough attention to the clamping.

It's not a bad idea to have the whole assembly and process mounted on a stout piece of plate: I used a slab of 10mm., of the variety often favoured for barbecue plates, again available at the corner shop.

With the first bead placed and the rim strip aligned, it's an easy matter, with the steel fairly soft from the welding, to bend the rim by hand, to the next clamp point, say, 75mm along the fillet. Another moderate bead and clamp, weld and bend until the ends sort of meet. I didn't try, but I would suggest that the weld bead *not* be continuous. To me, that'd be asking for distortion: The beads should be kept as small as possible, consistent with strength.

Hopefully, the rim strip will meet nicely at the ends, mine almost never do and I suspect that greater accuracy in the measurement of the diameter might be in order. Turn the wheel over and place the other side welds where the others aren't, i.e., in the gap. This balances the bead placement to some extent and may even correct the tendency for the rim to contract to the first welded side. Anyway, that's the theory.

With the welding finished, the wheels are pretty much complete and I was pleased that what appeared to be a dicey proposition turned out well.

The wheel hubs

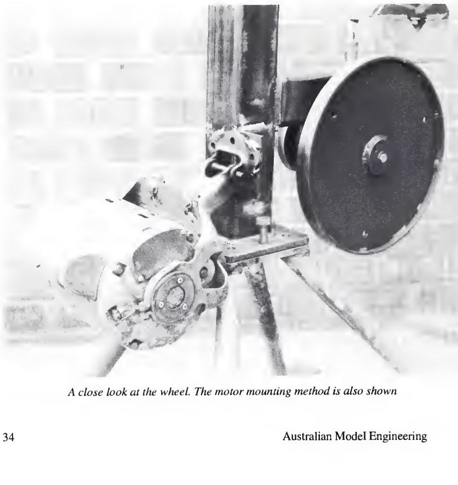
These are from 50mm NB ammonia-service tubing, with about an 8mm wall. A fair bit heavier than standard pipe which, by the way, is not a lot of use in this application. The wall thickness of standard pipe simply will not allow the amount of machining for the bearing seats, at least not without distortion, both in welding and machining. I also chose a bearing size which left as much "meat" on the tube wall as possible. The holes for the hubs were machined at the same time as the rim seating on the disc. The ammonia tube hubs or housings were machined to a force fit in the centre hole(s). When fitted, these are welded all round. A faceplate setup was used to true the rim with a dial test "spot-on". No surprises there. However, once the setup is satisfactorily positioned, the rim, rim edge and one side bearing recess can be machined without shifting the wheel.

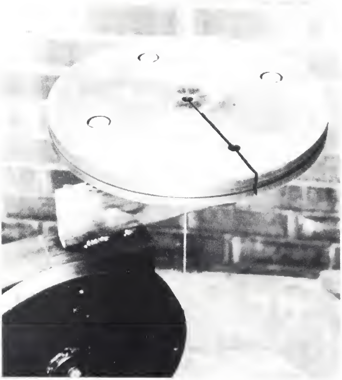
Your choice of how you choose to fit the bearings, but only the top wheel will have bearings, of course! The other is the driver, but it's a simple enough proposition to machine both the same and simply omit the bearing recesses on one.

With one side of both wheels complete, the wheels can be chucked in 3-jaw by the bearing recesses allowing the remaining rim edge and the other bearing bore to be machined. Rim machining is bit of a problem at 300mm diameter. HSS tooling is only just up to the job and that at my slowest speed of 38revs/min. Carbides are really mandatory and even then, some of the lesser brands are hard pressed. The rim surface speed is quite high and tooling needs careful consideration.

The table

Made from one of the cast-iron barbels that I didn't mess up. It is 300mm dia. and by the way, was a 20kg weight. The barbels were not bought from a retail source. I was able to find the foundry who cast the things originally and found they were available unpainted, in a range of sizes, for modest outlay. The iron is


A close look at the wheel. The motor mounting method is also shown



The table was made from one of the cast-iron barbels that I didn't mess up — it's 300mm diameter.

of middling grade, holes in the cored centre hole being a bit of a nuisance. However, hard spots were few and the things generally are a good source of solid, cast-iron discs, useful in a host of applications. Usually they machine well.

Again, the machining is a faceplate job and carbides are advisable. I always have difficulty in attaining an even finish across the face of larger items and this was certainly no exception. I envy the facility on many NC lathes where the spindle slows down as the tool reaches their periphery of a facing job.

No viable method of slotting the table for the blade is available, so this was simply a saw cut on the metal-chopper, kept as neat as possible. The hole at the centre of the table is 32mm dia., pretty large, yes, due to the thickness of the table itself and the requirement that it tilt to 45 degrees. The 32mm hole allows blade clearance with the table tilted. A removable piece of plate with a 12mm hole at its centre fits into a recess in the table top, for the usual 90 degree cutting jobs.

Table tilt and support

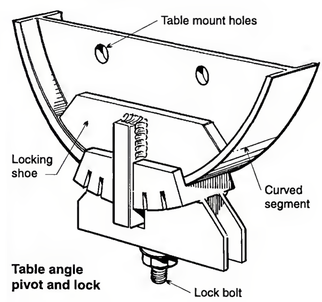
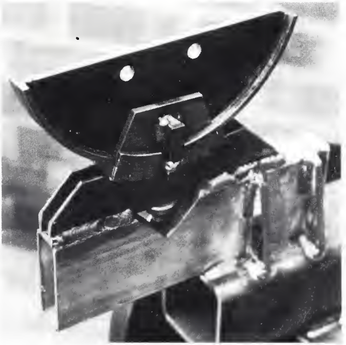


Table angle pivot and lock



A closer view of the table tilting mechanism.

My early thoughts on this were that a simple pivot should do the job. Wrong. A bit more thought will demonstrate that the location for the pivot centre needs to be a point slightly above the top surface of the table, i.e., at a point which will allow the table to pivot without fouling the blade: of course this depends on the thickness of the table itself and for maximum rigidity, the thicker the better. Mine is about 40mm thick at the centre boss.

A simple pivot also needs to be at one extreme edge of the table and the loadings will dictate its diameter. Probably the highest load will be the operator leaning on the thing. To apply a pivot of adequate diameter must bring the pivot bearing above the table surface and attached to one edge, this is unacceptable.

Unfortunately, complications now set in. I opted for a cutting contact point about 3.5mm above the top surface of the table. If this point be used as the centre of an arc, a locking quadrant section can be located below the table. The quadrant radius is a matter of choice, to some extent, and the location of the lower blade guides will also bear on any decision. I opted for a radius of 100mm.

Rather than continue this verbose description of the assembly, I'll let the sketch and pictures take over. Construction is not all that simple, but the thing is a very effective pivot and lock. It is firm and positive and, dare I say it, an improvement on the wood cutting machine mentioned earlier, where the blade runs between two segments. This was deemed a bit "iffy" and not just a bit messy and placement of the blade guides is a bit too far from the cutting point.

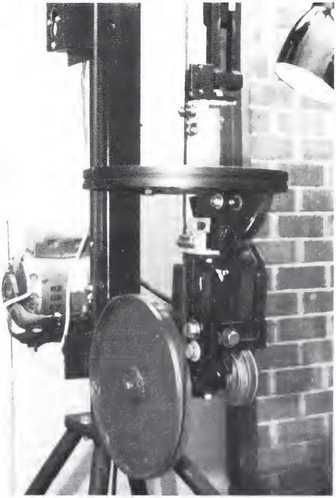
At no stage was overall height adjustment of the table considered; the commercial woodworking article has none itself. The upper blade guides and adjusters allow plenty of adjustment. An adjustable table could be a bit of an overkill. It could also introduce another problem into what is already a problem area.

However, the lower blade guides on bandosaurus are fully adjustable and can be brought almost into contact with the lower surface of the table. The table pivot lock nut is accessible with an open-end spanner.

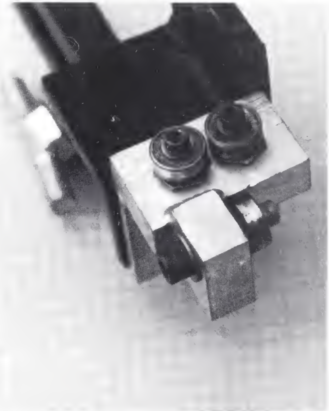
Looking at the photographs the thing looks decidedly Heath-Robinson-ish! Nevertheless it works and works well.

Blade guides

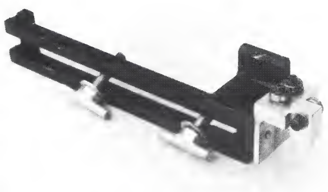
Pinched from the Taiwanese marvel, using two side guides, top and bottom and one guide or thrust bearing (sort of!) at the back of the blade, top and bottom. An industrial client of mine not long ago made a stock of 20mm sealed ball bearings redundant and guess who took



A view under the table showing the tilt mechanism and blade guides in place.



The blade guide head. Note the three ball bearings used as rollers.



A general view of the blade guide.

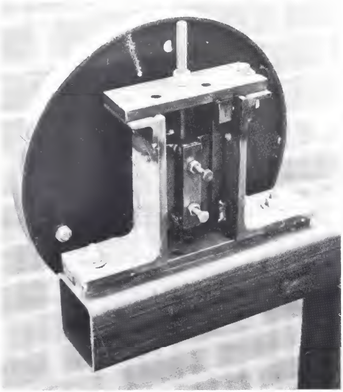
them to the tip! Again, one picture is worth another paragraph of waffle.

Each bearing is mounted on an eccentric adjuster, allowing 3.5mm travel. The eccentrics are fitted through blocks welded at 90 degrees to each other and this assembly is in turn welded to a from the blade for coarse positioning. The plate slots are sufficiently wide to provide some skew movement. The slotted plate is welded to two pieces of 16mm square, arranged and welded to form a long slot which provides plenty of vertical adjustment. Two holes are tapped in a receiver plate attached to the frame outriggers and the adjuster is locked into position with two 12mm bolts. The upper receiver plate itself, with the complete upper guide assembly, can be removed and turned upside down, thus opening the throat almost to the top frame outrigger. Great for large articles.

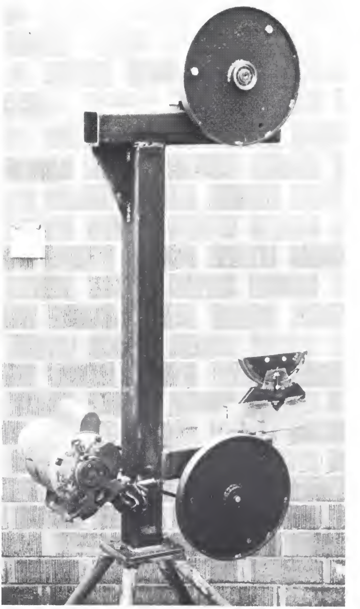
Blades

Bung a blade onto the (hopefully) true-running machinery. I clamped a straight-edge across the face of the lower pulley and trued the top one to it using feeler gauges. Wheel twist was by eyeball, using winding strips. The top pulley adjustment proved its worth and some slotting of its mechanism base holes was useful.

With a blade mounted, tension up a bit and spin the wheels by hand. If your wheels are well aligned, no amount of skew adjustment will



The upper wheel tensioning mechanism.



A general view of the saw frame and wheels.

The drive

I had a spare 375W motor and this drives through a pair of four-step A-section vee pulleys, tensioned by a turnbuckle with the motor pivoted by a car door hinge. I tried the lower pulley at 3200 revs/min, with no ill effects and no appreciable out-of-balance, but not without some concern for my welded rim. Imagine the excitement had the rim parted company at that speed! Anyway, 3200 revs/min is academic for my application and the two lower speeds have proved to be quite adequate for my application. The large solid wheels give a powerful flywheel action, but the machine coasts to a stop in just a few seconds.

The saw ready for use — well almost, don't forget to put the guards on first!

The lower, or driving pulley and shaft is carried by one self-aligning ball race and one deep-groove bearing in a cast housing, bolted to the lower frame outrigger. The lower pulley is square-keyed to its shaft as is the four-speed V-pulley. The bearing housing casting is one of a few I bought for pence from a local high school: Some students had performed some pretty inconsiderate surgery on them, but they were reclaimable and have proved most useful. I have also fabricated housings for other applications, again using ammonia tube for a body, welded to heavy bar ends, in which are machined the bearing seats. This is bit of fiddling around, but makes a very competent housing, at least the equal of the cast article.

coax the blade into the centre of either pulley. This is because the set of the blade teeth will cause the blade to seat unevenly on the pulley face and it will of course, run to the edge, with the teeth hanging over.

I had all sorts of schemes afoot to crown the pulleys, in accordance with a 1935 text on power belting, wherein the centre of the pulley face is machined, in this example, to a crown of about 1mm in the centre. This takes advantage of the tendency for belts and bands to run to the highest point of a pulley. However, as the text says, if the shafts are true and parallel, then no crown should be necessary and furthermore, quote: "high crowns will throw a belt off a misaligned pulley as quickly as if there were no crown at all".

I really did not fancy the idea of crowning the pulleys, having done a little reading, so as a trial, I wound on a couple of layers of PVC insulating tape and Bingo! Centred blade! Or blade positioned where I wanted it, according to the position of the tape edge. Nothing more was or needs to be done. The stuff wears quite well and allows stray chips, particularly aluminium, to be pressed into the surface without upsetting tension. Aluminium is always a problem with my Taiwanese metal-chopper, whose pulleys are bare cast-iron. In fact, the distributors recommend that aluminium not be cut.

By the way, bandosaurus has proved most capable in cleaving various lumps of brass and copper: certainly when handling sheet copper, the absence of distortion from the cutting action of bench shears, is a welcome benefit.

Operation and finishing touches

The narrower blades need close guidance and the back bearing is brought into light contact when unloaded. Running the bearing away from the blade seems to give rise to a case of blade "jitters". A lot of tension on the side guides is not only unnecessary, it is also noisy and does not help blade twist in tight corners. Better to use minimal distance between guides and table, in other words, adjust the top guide assembly as low as is practicable. I have cut 32mm dia. circles in 100mm thick oregon and the sides of the cylinder removed were parallel and the finish was good.

Blade tension is readily relieved and applied through the top tensioner: Good reason for care in the ergonomics department and a sure blade and money-saver.

The tendency, with a project nearing completion, is to lash up the switchgear arrangements. For once, I resisted the temptation, and a nice solid, safe job can be seen in the pictures. Well, I think it is, anyway!

A Horizontal Head Attachment for a Vertical Mill

By Robert Weir

Drawings for publication by Ken Gifford, photos by the author

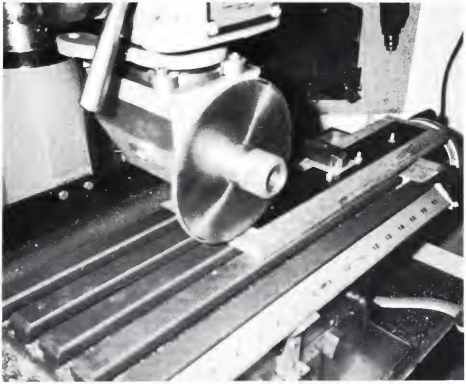
While living overseas, in the USA to be precise, I bought an ENCO 105-1100 vertical mill as an addition to my workshop. With a 1HP motor and a 23"x 71/2" table and being robust and accurate, the machine is remarkably suitable for my needs.

I fitted the "X" and "Y" axes of the mill table with scales graduated in Imperial measure. The table feed screws were graduated in .001" increments as supplied. The arrangement allows me to use the machine in the style of a jig borer facilitating accurate layout and speedy machining.

Shortly after putting the machine into service, I realised that much of the machining work that I seem to undertake needs to be carried out horizontally. It was clear that I needed a horizontal head attachment, but enquiries revealed that the Taiwanese manufacturer did not have such a thing available. The project then developed as a "Do It Yourself".

The design I settled for is described here. Not everybody will have a machine of identical size to mine of course, but I am sure that adaptations can be made to suit a particular machine.

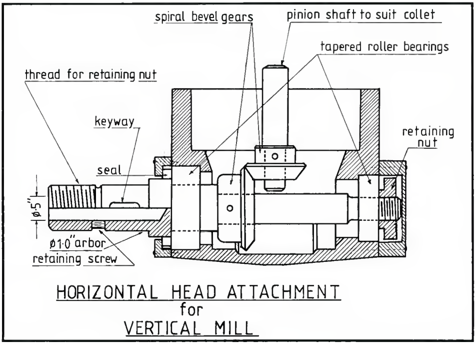
In the first instance I carefully inspected the vertical spindle sleeve to satisfy myself that it was sufficiently robust to carry a horizontal head attachment. This it was, conditional upon the sleeve being rigidly clamped before any machining operations were commenced. Additionally, to accommodate the lower spindle bearing, the sleeve on this mill has a large housing at the lower end. This appeared as an adequate location for clamping a horizontal head attachment.



The horizontal head with a 6" diameter slitting saw mounted.

I did foresee a problem with alignment of the horizontal head because of the manner in which the vertical spindle sleeve is restrained from turning. The sleeve has a groove milled down one side into which an indent pin loosely slides and prevents the sleeve from rotating. The pin is relatively small and obviously not strong enough to restrain the offset load imposed by the extension of the horizontal head when machining.

At this stage I felt that I would have to realign the head relative to the table each time a vertical adjustment was on the "Z" axis. Fortunately, in practice I discovered that the groove was quite accurately milled. While making adjustments and the clamp was released, as long as I maintained slight hand pressure on the head to ensure that the indent peg registered on the side of the groove, sufficient accuracy was maintained and only one setup was required.



So it was decided; a robust head machined from a block of cast iron, made to accommodate a set of bevel gears and support a spindle running in tapered roller bearings, would be mounted to the vertical spindle lower bearing housing.

The minimum spindle speed on this machine as purchased is 90 rpm. The opportunity was therefore taken to make the machine more suitable for using a 6" slitting saw by reducing the shaft speed to 45 rpm. This was achieved using bevel gears with a 2:1 ratio. I used a set of hardened spiral bevel gears obtained from Boston Gear, their catalogue nos. Sh 142G and Sh 142P. These gears are rated for 0.65 HP at an output speed of 300 rpm and 0.1 HP at 45 rpm. Clearly there is some overload during heavy

machining at 45 rpm, but this is an intermittent thing and the gears have exhibited no damage over the years.

Timken tapered roller bearings were used; Cup A4138/Cone A4050 and Cup A6157/Cone A6062. After assembly, I installed a mild pre-load using the screwed collar at the rear end of the head.

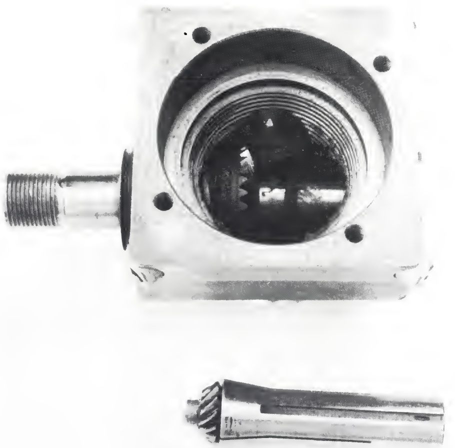
The housing was lubricated with grease, but an oil seal was fitted at the cutter end in the interest of excluding metal particles. For similar reasons, a close fitting aluminium collar was fitted to the head body over the screwed collar at the rear end.

For the spindle, I selected a piece of SAE 4140 steel which is quite tough, yet machines easily. A production shop would possibly have hardened this item to prevent bruising, but for the use I give it this proves to be unnecessary.

The working end of the shaft was turned to 1" diameter, provided with a keyway for mounting 1" bore slitting saws and side and face cutters, and with a thread for a locking nut. The shaft also has a 1/2" bored hole accurately drilled and reamed to accommodate the shanks of 1/2" mills, chucks and miscellaneous arbors.

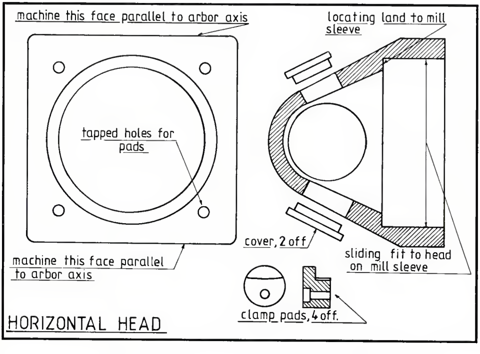
The head body was machined with the addition of flats on each side parallel to the horizontal spindle centre line. This was to enable the head to be aligned accurately with the mill table centre line before clamping and prior to operation.

The bevel pinion was mounted on a 7/16" diameter stub shaft to allow grasping with a collet in the vertical spindle. A projection of this stub through the pinion just touches the horizontal shaft during assembly to ensure that the correct centre distance between the gears has been achieved. An inspection port with cover on either side of the head enables viewing and confirmation of correct meshing before tightening the collet with a threaded rod passing through the vertical spindle.



A view of the head interior. The R8 collar and bevel gear is shown below.
Note: the tapped holes on the top surface have been offset to avoid the quill clamping allen screws horizontally drilled and tapped through from the corners.

I envisaged quite elaborate clamping arrangements to secure the head to the sleeve. This involved Allen headed locating screws and drilled locating holes in the vertical sleeve. All this was unnecessary. By merely boring the head to a close fit to the sleeve and arranging a clamping land, four screws and clamp pads with screwed holes on the head, a quite adequate fixing is achieved.



The whole design has proved to be of comparable robustness to the mill itself and I have been able to get quite reasonable machining accuracy with just a little patience when setting up and aligning the table and head centre lines. It has certainly been most suitable for my requirements.

A word of advice to prospective constructors of this head is to make sure that you adapt scaled dimensions of the drawings to the requirements of your particular mill. Pay close attention to allowing sufficient space in the head so that the correct meshing of the pinion and gear will occur while still retaining room for the collet connection of the pinion to the vertical spindle. The drawing shows a rounded bottom to the body. When I made it, I decided to machine this flat because it was easier and it has now proved to be more satisfactory in use as it allows the head to sit flat on the table as the vertical spindle is lowered into it.

Dynamic Braking for Model Locos

by Ian Strawbridge

A growing number of model engineers have gained or are gaining experience with electric powered (battery or petrol-electric) model locomotives. Most of the current development has been associated with getting the locomotive to perform work. The AME 422 series of articles has created further interest and is a good example. However, another often overlooked aspect of the model locomotive is that of braking performance and train control, in particular during long, downhill, gradients.

Dynamic braking is the ability of the locomotive to use its' traction motors as generators, and thus placing a braking effort against the driven axles. One of the best attributes of dynamic braking is similarity in performance to ABS Anti-lock Braking Systems, ie. it can supply maximum braking effort without (normally) wheel lockup problems. If the wheels approach the point of locking up the braking effort diminishes - due to the traction motor no longer producing useable power.

Regenerative braking

It is probably an opportune time to mention regenerative braking. Both dynamic braking and regenerative braking produce similar results on full size locomotives. However on a model locomotive regenerative braking does not normally produce very good results (in relation to producing very good braking effort) due to the traction motor voltage required to "overcome" (ie be higher than) the supply voltage. In a model this is somewhat difficult to achieve, although it has been used in some instances to provide some power back to batteries for recharging purposes. For this article I shall be discussing only dynamic braking.

For the purposes of this article I am going to assume that some of you are familiar with basic circuits and the AME 422. There will not be much discussion on theory as most of the information will hopefully relate to real world conditions.

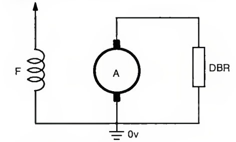
The method that will be described here is to switch motor power off the traction motor armature and energise only the traction motor fields. A suitable load is placed across the armature, thus, being low in resistance, this will be the dynamic braking load. It should not be a complete short circuit as reduced life of the traction motor brushes may result due to excessive power dissipation in them. An appropriate resistor can in most cases be the chassis of the locomotive! When the cable resistance and the chassis resistance is taken into account, there should be sufficient resistance to prevent brush burning problems and also low enough resistance to provide sufficient braking effort.

This is also dependent on the traction motor design voltage. For 6-24 volt motors the above should present no problems, however for higher voltages than, say, 32 volts, it becomes important to work out the appropriate resistance values or problems may result. As this is beyond the intended scope of this article we shall make no further mention of it!

Braking methods

The dynamic braking of my petrol electric loco EMD-1, which is based on an GM-Amtrak SDF40F, is operated in either of two ways.

Figure 1 - Basic dynamic brake circuit



A - Traction motor armature

F - Traction motor fields

DBR - Dynamic brake resistor

Figure 2 - Basic dynamic brake circuit

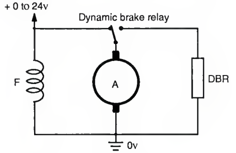
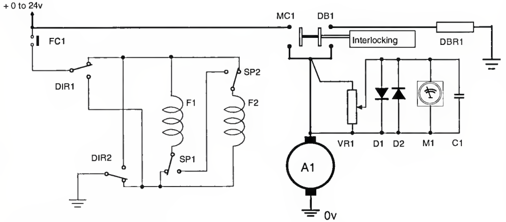


Figure 3 - Dynamic braking EMD-1



DIR1 & DIR2 Direction control relay one

SP1 & SP2 Series/parallel transition relay

FC1 Field control relay

MC1 Master control relay

DB1 Dynamic braking relay

MC1 and DB1 are interlocked either mechanically or electrically - so that it is not possible to operate both contactors at the same time.

VR1 Variable resistor 200 ohm

D1, D2 1N4002 diodes

C1 10uF Non-polarised capacitor

M1 Centre zero meter, 100uA

DBR Dynamic brake resistor (see text)

1. The first method is with the selector. The throttle is closed and the selector is moved from which-ever the current operating mode is (for instance: Forward - Series -1) to dynamic braking and then the throttle becomes the braking control. By opening the throttle further more braking effort can be achieved (this is dependent on other things such as train load and speed).

2. The second method is to push the big red button! This is for emergencies and operates in conjunction with the train brake. The difference being is that the throttle setting is opened to a preset amount. (my loco uses a stepper motor for the throttle control.)

Braking effort selection

The braking effort available ranges from mild for holding a trains' speed down a gradient, to high for very quick stops. On my locomotive the traction motor gearing is 6.25:1, and as the braking effort produced by the traction motor is multiplied by this gear ratio, the locomotive will almost come to a complete stop on dynamic braking alone.

Figure 1 - Shows the basis for dynamic braking . This shows only one traction motor.

Figure 2 - Has included basic armature switching from motoring to dynamic braking. It should be realised that, as with any high current switching, the supply voltage should be brought as close to zero as possible, whilst the switching is being performed, to promote switch gear longevity.

Figure 3 - Describes the circuit as used on my locomotive. This includes direction switching for the fields. A load meter should be provided for each traction motor in use on your locomotive. The load meters will give you a good indication on traction bogie load balance, and also if a problem should develop, it may be detected earlier, possibly avoiding excessive damage. (Especially fried traction motors!) Centre zero meters should be used as these will indicate (+) motoring and (-) dynamic braking current.

With the construction of any electric powered locomotive it is important that you wire the loco with cable that is not only rated sufficiently to handle the intended design current, but also allow for a sufficient safety margin and also to minimise resistive losses in the cable.

Cable size

A good supply of cable for traction motor armature circuits is automotive battery cable that is used between the battery and the starter motor or some of the better quality "jump-start" cable wire.

Any chassis connections should be via a suitable size lug (which should also be soldered as well as crimped) and the area to which you are going to attach the lug should be filed to ensure a suitable contact.

Use as few switch points as possible. The more contactors or relays that are in the circuit path the more chance for problems to develop. Motors are extremely inductive devices (especially the fields!) and as such produce quite enormous reverse voltages when rapidly switched. Some of this can be minimised with diodes to clamp the back EMF, or by using MOVs or capacitor -resistor combinations as a spark quench. One of the easier methods to help prolong the life of contacts is as used on full scale locomotives - that is at the point of switching the engine RPM is reduced, and then the switching is performed under minimal loading. Once completed the engine RPM is again increased to whatever throttle opening the driver has selected.

In a petrol-electric locomotive it should be remembered that heat and exhaust fumes, oil and grease etc abound. These are, of course, the natural enemy of electronics and switching equipment, and wherever possible you should try to isolate the control equipment away from the petrol engine environment.

Throttle control

One of the most common problems I come across is that with a petrol engine a variety of throttle controls are in use, the most common being that from a lawn mower. There is nothing wrong with this, excepting that there is no throttle location sensing, something I consider essential for successful locomotive control. Why not consider using micro-switches to indicate off idle and maximum throttle conditions. These signals may then be used to vary the loading ie. the regulator settings for the alternator /generator. By using preset pots for each of the settings the best of all worlds may be achieved.

Table 1 below shows an example.

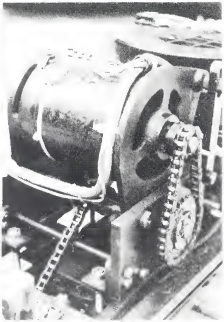
The ultimate solution is to use a 8 position switch, with one bank used to control a stepper motor or servo-motor and the 2nd bank having preset pots for each position for the regulator.

I hope the above is a reasonable source of ideas and practical solutions to some problems that have previously been encountered with my own locos.

Throttle Position :	Alternator Regulator :	Petrol Engine:
Idle 1st notch and 2-3 notches	None-low load	Engine idles normally instead of erratically.
4-7 notches (mid throttle)	Low-mid load	Engine is able to carry load ok.
Full Throttle 8 notch	Mid-high load	Engine is already full throttle for maximum effort.

Table 1

Continued from page 25



A traction bogie on EMD-1

R3 and C2 have a function similar to the diode D1, so that excessive sparking does not occur across the solenoid contacts. They are more commonly referred to as a "spark quench".

The contacts on the solenoid would appear to be able to handle 100-150 Amps which should be more than adequate for 5 or 7¼ inch gauge locomotives.

The solenoids should be mounted vertically for correct operation. The circuit for driving the solenoid is not really critical and does not have to be mounted near the solenoid provided suitably heavy gauge wire is used to prevent voltage loss from becoming too great and making the solenoid operation unreliable. Of course, if you mount the solenoid to the locomotive chassis then this will be more than ample for the negative supply. If the solenoid does not operate reliably then it may be necessary to lower the resistance of the R1/R2 combination. This is easily done by adding R4, a 3rd 33 ohm resistor in parallel with R1/R2.

The photographs show the detail of how the solenoid looks and how it is mounted. There are also differing variations on the solenoid; for example the Leyland solenoid is round with an operate button on the bottom.

	Parts List *(Dick Smith part nos.)*
R1-2	Two 33 ohm 10 watt resistors. You may need a third resistor (R4) depending on your particular solenoid.
R3	10 ohm 5 watt resistor. R1626
C1	10,000uF, 25v or above, electrolytic capacitor. R4595, R4483, *Altronics* R5234 or *Altronics* R6730.
C2	0.22uF Metallised Polyester ("Greencap"). R2010
D1	1N5408 Diode. Z3228

Repairs to Locomotive Boilers on the Victorian Railways

Nicholson Thermic Syphons

by Doug Baxter

Drawings for publication by Ken Gifford unless otherwise noted

Opinion on the usefulness of thermic syphons in model boilers varies. In his book ***The Model Steam Locomotive****, Martin Evans claims improved steam raising ability, particularly in one inch scale and larger. A thermic syphon is a specially shaped pipe that allows water to flow through a small inlet at the bottom of the firebox inner throat or tubeplate (where there is little circulation) and direct it at an angle across the firebox until it emerges as a large outlet on the top of the firebox. In full-size locomotive construction however, the shape and position of the syphon caused problems, and this is the subject of this article... ed.*

It was initially anticipated that there would be greater movement where the syphon was attached on the inner throat due to the great variation of heat in the vicinity of the flange. The row of flexible stays around the syphons were backed off one and a quarter turns while all other flexible stays were backed off half a turn. The diameter of these stays were increased to an inch and one eighth while all other flexible stays were an inch in diameter. This movement would no doubt lead to work hardening and eventually causing cracks to develop in the neck.

To overcome this the following procedure was adopted:

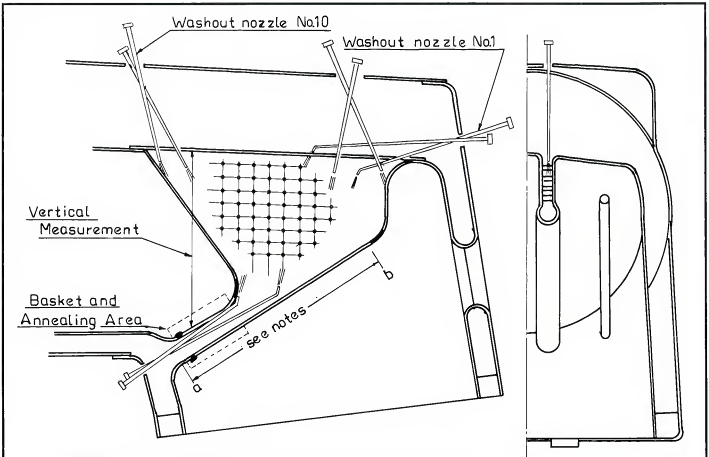
At the first boiler examination and test (12 months after initial application) no action to be taken. At the second boiler examination and test (after 2 years), the syphons were to be released, annealed, closed and rewelded.

The procedure

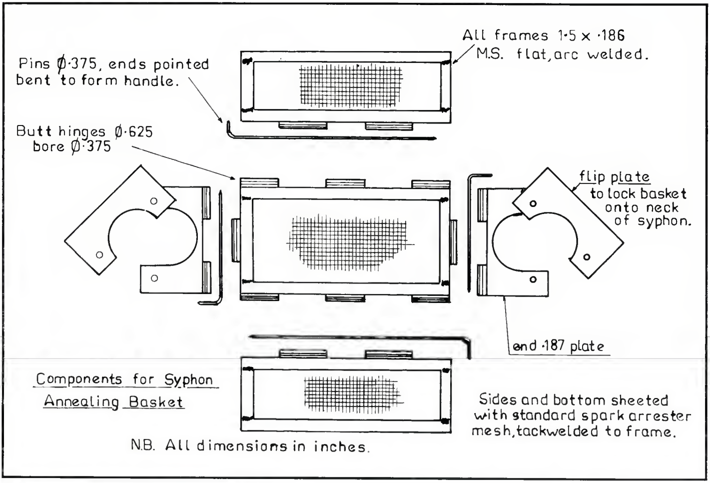
Ascertain the top centre line of the neck and at a point about 2" up from the weld make a light centre pop. Then using telescopic trammels measure the distance to the crown vertical above the centre pop and record this measurement. If more than one syphon is applied to the firebox a separate measurement is required for each syphon as marked on Figure 1.

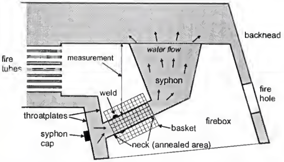
The weld was removed by pneumatic chisels. The flange in the inner throat was heated by oxy-acetylene equipment to a red heat and small wedges were driven down between the flange and the neck of the syphon until a clearance of about a quarter of an inch was achieved. The annealing process was carried out by placing a portable assembled basket around the neck. The basket consisted of a base about 15" by 21", sides about 9" high and two flip plates (Fig. 2).

The reason for this type of construction was that the baskets had to be passed in through the fire hole and assembled in position. With the basket in position a fire using kindling wood was started using compressed air to cause a draft. When this was burning well charcoal was added to completely fill the



METHOD OF WASHING OUT FIREBOX SYPHONS





Boiler cross-section schematic showing the syphon.
Drawn: Tom Hulse

basket. Since the burning of charcoal gives off poisonous carbon monoxide, the operation of applying the charcoal was carried out with a special scoop attached to a handle about eight feet long. The boilermaker applied it from the foot plate and an air blower was placed down the chimney to assist removal of the carbon monoxide from the firebox, tubes etc.

Keeping a watch

The syphon cap on the outer throat had been loosened and removing it by hand the boilermaker would constantly look up the inside of the neck of the syphon. Eventually it would commence to turn red. When a good red heat over a distance of about 9" was obtained, using the long handled scoop a bag of lime was applied to the basket completely covering the syphon neck within the basket. All damper doors, fire hole door and chimney top were closed or covered until the following day.

The basket was disassembled with all the remaining charcoal and lime dropping into the ashpan. Any variation in the measurement from the neck to the crown was noted and recorded on the boiler certificate. The inner throat plate flanges were heated by the oxy-acetylene, closed onto the syphon neck and rewelded.

Over a period of about six years it was found that there was no variation in the height of the crown after the annealing so the procedure of annealing without release was adopted, and later still this annealing was carried out using the oxy-acetylene for heating prior to applying the lime.

Effectiveness

On consulting the boiler record sheet of boiler reg. No.770 of H220 the following relating to syphons shows:

- New at the time of original manufacture 1941.
- At the end of four years (1945), lower throat plate patched below thermic syphon connections, syphon connections released, necks annealed and re arc welded.
- At the internal examination of the boiler in 1951, new part sides were applied to the inner firebox.

From the above it can be seen that the original syphons were still in place when H220 was retired late in 1955. It also records that the yearly process of releasing, annealing and reconnecting was carried out. This adds up to a life of 14 years. This was not applicable to all syphons. Some on the X class boilers had new necks while others had new necks with the bottom two rows of stays. With general deterioration of syphons in X class boilers, the Foreman Boilermaker with the aid of Block design personnel designed a very complicated block to press a syphon up to the top row of stays. It was most successful but they were politely told that it would be infringing the patent.

Possible faults

The early American literature relating to syphons particularly refers to the possibility of drilling and tapping swarf building up along the bottom continuation of the neck causing overheating in this area. No doubt this was the reason for the rigid washout procedure laid down in the *Rolling Stock Book of Instructions* (as per Fig. 1). From practical experience on syphons applied to boilers built during the period from 1947 to 1951 the internal space was completely free of any swarf, etc., when supplied from the manufacturer.

Towards the end of the steam era, when isolated pits occurred along the bottom neck extension they were returned to full thickness by pad welding on the fire side.

A 5" gauge NSWGR 422 class Diesel Outline Locomotive

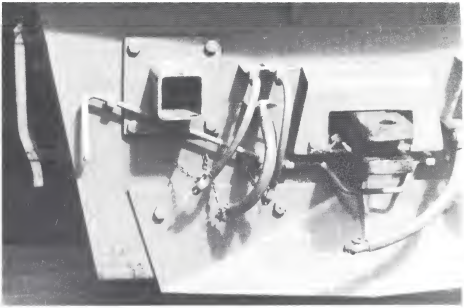
Part 23 of the construction of a battery electric locomotive

Barry Glover and Neil Graham complete the detailing

Drawings for publication by Neil Graham and photos by Barry Glover and Neil Graham

The long awaited conclusion to this series is getting closer — but not quite yet! This part of the series sees the completion of the detailing components as far as the AME project builders are concerned.

Since their introduction in 1969, many 422s have experienced modifications to the original design, not to mention paint jobs! If you are building a "generic" representative of the class then the differences are not important. However, if you intend to follow our lead and build a specific locomotive in the class, then you should select the loco number early in detailing. We will describe several features that are specific to some 422s and not others. Later on we will document these slight differences between locos. This will make the selected numbering of your loco unique. For example, while some locos have buffer plates intact, most now have them removed. Some locos have the staff exchanger opening covered in, most don't, etc, etc...



The front end of our 422 class showing the coupler pin lift bar in position.

Oops!

Last issue we accidentally left drawing No.72 out of the 422 article. The drawing titled Air Cocks Fixing Plates is reproduced here for those fitting the air hoses at the loco ends. Our sincerest apologies for the inconvenience caused.

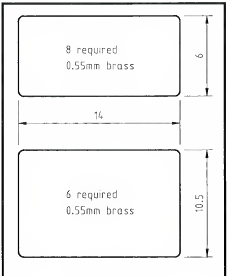


Figure 72
AIR COCKS FIXING PLATES

Panel ribbing

Most of the 422 class locos have some slightly raised pressings in the mansard sections between the No.1 end and the cooling grids, and between the two sets of inlet louvres. Now before you go any further, if you are going to number your locomotive 42201, 42202 or 42203, then ignore this section. The first three locos of the class did not have these pressings.

The locations of the ribs are shown in AME Issue 56, Sept-Oct 1994, page 43, Figure 18.

To have had them pressed into the original sheeting would have been a difficult task. So our option is to have them made up of half-round material. You will need a total of 1.8m of this half-round material. The size needed is 2mm (3⁄32" is okay.) If you cannot purchase it from the model engineering suppliers, then see the boxed article by Peter Johnson in this issue.

Mark along the mansards with light centrelines in the locations shown in Figure 18 (issue 56). Fixing the strips to the loco is a fiddly job. The suggested method is to get the high-speed drill (eg. a Dremel®) and a 1mm drill. Drill through the half-round in five places along the longitudinal centreline of each piece of half-round. Then counterbore them half way through with a 1.25mm drill. Then put a very slight reverse bend in the strips. The trick now is to lightly (tack) superglue the strips in the correct locations along their marked lines. After they are all set in location, spot and drill through the mansard with the 1mm drill.

Next job is to raid the spouse's sewing kit and grab a hand-full of pins. There are several sizes, grab the 12 x 0.9mm diameter pins. Put

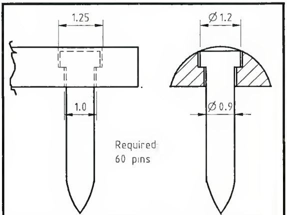
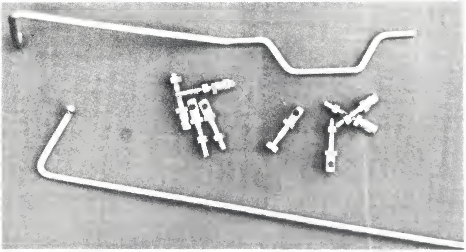


Figure 81 MANSARD STRIP FASTENER



The coupler pin lift bars. The top bar was our practice run. The lower bar first two bends have been formed. Two saddles will be slid on before the next bend is executed.

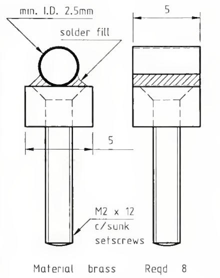


Figure 82a

COUPLER LIFT BAR SADDLES

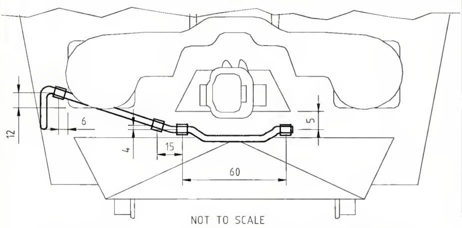


Figure 82 COUPLER LIFT BAR ARRANGEMENT

a pin chuck in your small lathe and set it to at least 2000 rev/min and turn down the pin heads to 1.2mm — you will need 60 of these.

N.B. An alternative is to collet the pins in the Dremel and file the heads down to size.

Put the pins in the strips on the loco (Figure 81 gives the general idea) and then get the low heat port-a-gas out and soft solder the inside protrusions of the pins to the inside of the mansard roof — all 60 of them! When finished, snip off the excess of the pins on the inside with sidecutters. Make up a small batch of Epifiller® and bog around the pinheads. Wait a couple of days for the bog to dry then rub down to the profile of the half-round.

Coupler pin lifting bar

At each end of the locomotive, on the observer's side, is a lift bar which is angled down under the knuckle coupler and, in real life, is attached to the lift pin at the coupler. This device has a universal to accommodate the change in direction near the coupler. It is mounted to the pilot with four little saddles which are secured with bolts. Figure 82 shows the arrangement.

We shall represent this device with a piece of 2.5mm diameter wire rod bent to shape. The saddles will be represented by little brass fabrications.

Make up eight saddles as per Figure 82a. We made them up from one stick of 3 x 5 x 60mm flat and a piece of 3.2mm (1/8") thin wall tubular section the same length (the ID of the tube must not be less than 2.5mm), then cut it up into eight pieces after it was complete. The two pieces are made longer than necessary so as to have something to hang onto while putting it together. The 3 x 5mm piece is marked at 5.5mm centres. Drill and tap to M2 (8BA is okay) then countersink along one side. Screw in eight M2 x 12mm countersunk setscrews. Get out the silver soldering gear and flash it into the screws on the head side. Pickle it and tin the length of the bar with soft solder. Tin the tubular section next. Put the tubular section along the length and soft solder the tube for the full length into the 3 x 5mm flat. Make a nice fillet of solder along each side. Bisect the distance between each screw and mark it. With a thin blade hobby saw, cut each saddle off the stick until you have eight pieces.

Mark the front of the pilot and centre pop the location where the four saddle holes are located as shown in Figure 82. Drill right through 3mm. This will give a good clearance for easier alignment later on.

The coupler lifting bar is quite a complex shape. Refer to Figure 82b and the accompanying photos to get the drift of the shape. To make it up we used a piece of general purpose (G.P.) 2.5mm welding rod. G.P. welding rods are nice and soft and therefore easy to bend to

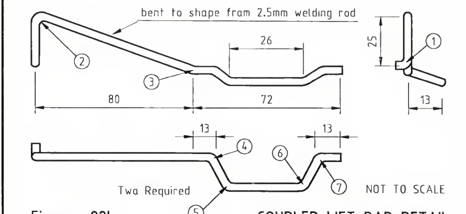
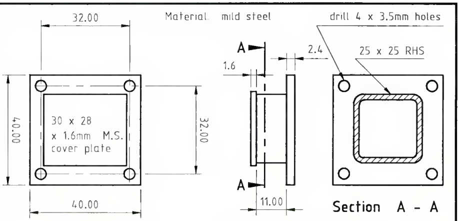


Figure 82b COUPLER LIFT BAR DETAIL



Section A - A

Figure 83 SUBSTITUTE BUFFERS

shape. The following is the order of events referring to Figure 82b

- Bend the bottom of the lift handle (1) then trim to length.
- Bend top of lift handle (2).
- Slide on one saddle up to near the last bend.
- Make bend (3).
- Slide on the next saddle to previous bend.
- Make the remaining bends in order of (4), (5), (6) and (7).
- Slide on the last saddle.

We actually made three of these devices. The first one we just bent up without the saddles just to get the shape right and see that it sat correctly. Offer the device up to the loco after each bending operation and check that each section is correct (and over the top of each hole).

After you have two of these twisted rods with their saddles to the correct shape, they can be offered up to the pilot aprons and fixed in position if all is correct.

Buffers

As mentioned on previous occasions, some (if not most) of the 422 class now have had

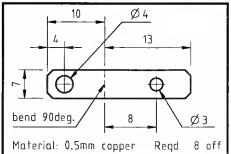


Figure 84a LAMPHOLDER

their buffers removed. If you plan to paint your locomotive in the stealth blue livery or the candy scheme then, to be strictly correct, you will need to select the loco differences to suit your number or vice versa. You may need to remove the conventional buffer pockets and diaphragm plate (depending on loco number and era). They need to be replaced with two plain blocks. Refer to Figure 83 for full details.

Number box lights

Next job is to make the light fittings for the number boxes. They are made up from a piece of plastic panel (bakelite can be used) cut into four pelmets (Figure 84b). Note that the shape shown is only approximate and you will need to contour the top edge to suit the casting shape inside your particular cabs. All four of our pelmets are different profiles across the top! Next, get some 0.5mm copper strip cut into eight pieces drilled and bent to the shape shown in Figure 84 and 84a.

Four 12 volt x 3 watt cylindrical automotive lamps and eight M2.5 x 12 countersunk setscrews with 16 washers and 16 nuts are needed. Also, you will need eight countersunk setscrews M2.5 x 15 long (which we cut the heads off and made into studs) with eight nuts to suit. 6BA is a suitable alternative for both the aforementioned applications.

Referring to Figure 84a, eight lamp holders are required. Simply mark them out, drill as required and cut them out. Then cut and drill a piece of panel to the dimensions in Figure 84b. Offer the pelmet up inside the cab and position it so that it completely covers and overlaps the number box. Spot drill the holes,

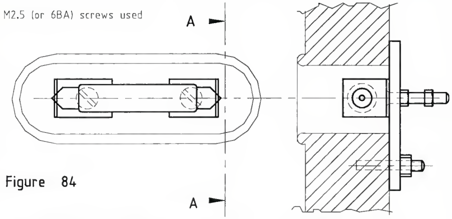
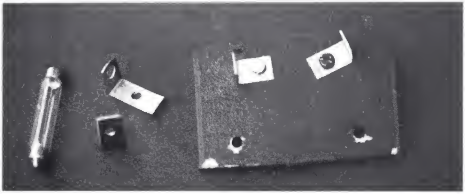


Figure 84

NUMBER BOX LAMP ARRANGEMENT Section A - A



Components for number box lamps.

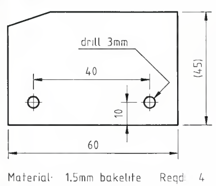
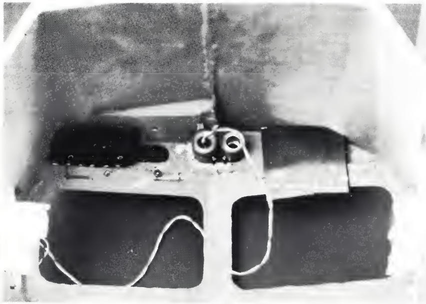


Figure 84b PELMET



Locating and marking the plastic pelmet.

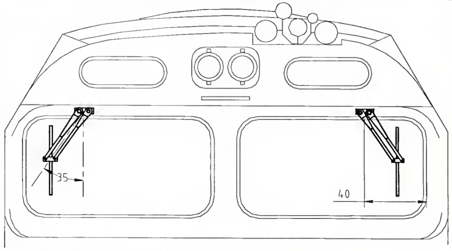


Figure 85 WINDSCREEN WIPER ARRANGEMENT

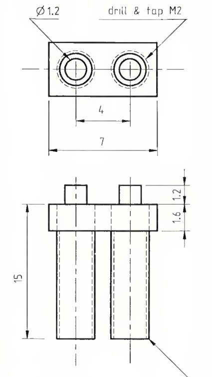


Figure 85a WINDSCREEN WIPERS MOUNTING BRACKET

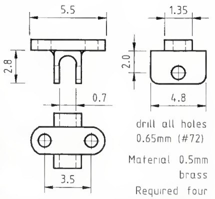
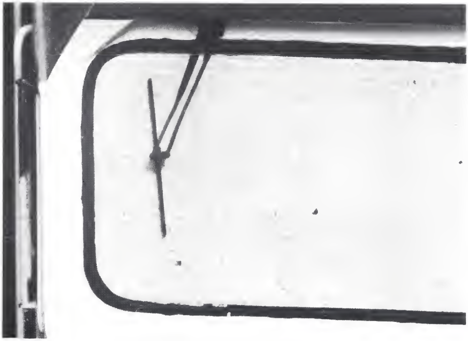


Figure 85c BLADE HOLDER



The wipers on the observer's side of the locomotive.

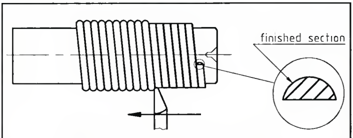
remove the pelmet and carefully drill and tap M2.5 (or 6BA) into the cab for 5 to 6mm only. Put a dab of Loctite® on the studs and screw them home into the tapped holes.

Return the pelmet to the cab inside, then fasten it in position. Turn the cab around so you are facing the front and with a scriber, mark the shape of the number box opening onto the pelmet. Now remove the pelmet from the engine. Mark a faint centreline along the long axis of the stretched oval.

Put a lamp into the lamp holders (with the lamp holder angle piece facing inwards), and measure the distance between the fastening holes. Transfer this distance to the pelmet, centring the distance on the marked centreline. Pop and drill through with a 3mm drill.

Making Half-Round Beading

by Peter B Johnson



MAKING HALF ROUND BEADING

The first step is to make a true running mandrel. Mount it in the lathe with the tailstock live centre to restrain the free end. Drill a starter hole in the free end of the mandrel then wind the brass wire on tightly. Remove from the lathe and sweat the wire to the mandrel.

Return the assembly to the lathe, turn the round down to the beading size, then remove from the lathe. Finally, unsweat from the mandrel and wipe away the solder.

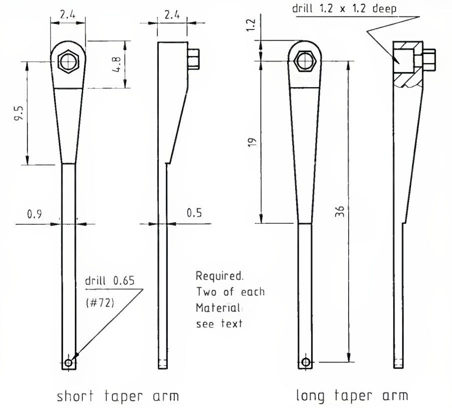


Figure 85b WIPER ARMS

Fasten one holder onto the pelmet. Put the next holder on loosely, then put the lamp in position. Now tighten up the lamp holder so that the lamp is held firmly.

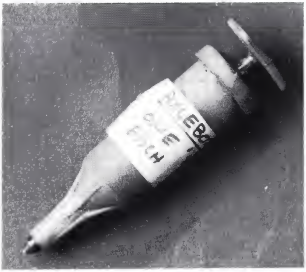
Return the pelmet (with lamp intact) to the loco and fasten it in position. Check that the lamp is central in the slot. Now go through the same procedure with the other three lamp holding assemblies.

Wiring the lamps in is a snack. The lamps in each end are to be wired in series. This gives them an effective voltage across lamp of six volts. When connected with the lighting circuit, the light given off by the lamps is not bright (or hot). Later on, when the box numbers are installed the light shines through with a soft glow (some will say dull) which is just the same as the big engines!

Windscreen wipers

In order for our crews to see where they are going when confronted by the months of rain and drizzle when working through the Southern Highlands of NSW, a decent set of windscreen wipers are needed. In the "good old days" the driver poked his head out through the cab porthole and squinted through the dust and lashing rain! Not today however, four sets of "you-beaut" windscreen wipers are provided, i.e. two sets at each end.

When building the prototype engines, Clyde Engineering must have hunted around



The one-shot grease gun.

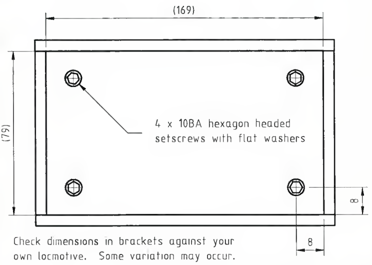


Figure 86 PANEL INSERT FOR BI-CENTENNIAL 42218

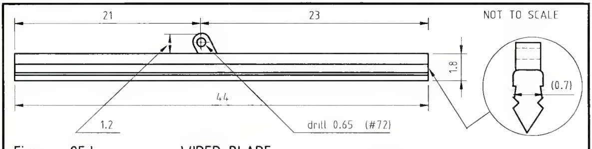


Figure 85d **WIPER BLADE** Required four

drilled and tapped to M2 then cut to lengths. The screws are put in the lathe and the head removed and turned down to 1.2mm diameter for 1.2mm. Screw them into the blocks with the turned part protruding.

Offer the wiper assemblies up to the holding blocks and slip onto the stubs. Turn them upside down and spot soft solder the taper arms to the blocks. Referring to Figure 85, drill 2.5mm diameter holes in the location shown on the cabs. Put the cab front windows in on one end of the loco, then offer the left and right hand wiper assemblies up to the cab and put in position, the wiper blade should be towards the outside of the locomotive. The operating arms may have to be bent slightly to achieve a good fit. When all is well, remove them from the locomotive, then remove the window pane and store away.

Prepare the wiper assembly surfaces for painting with a brass primer. This can be purchased from any model trains hobby shop or use any type of etch primer suitably thinned

Wiper blade assemblies, on the left ready to install on the locomotive cab and on the right partially assembled, waiting for the mounting block to be soft soldered on.

the automotive truck wiper suppliers, because they are rather flimsy looking things even in full-size. In our size they are just downright weak! Nevertheless we will attempt to make a reasonable copy of them. While doing this we need to beef them up a bit without losing the fine look of the prototype.

The accompanying diagrams (Figures 85, 85a, b, c and d) show the arrangement of the wipers, but, if you wish to take the easy way, Scobie & Glover Sheetmetal Pty. Ltd., is selling them as a kit of lost wax castings. This is the way we went with our locomotive, so we will base our description on a method utilising the available castings. The kit as supplied has four short taper arms, four long taper arms, 12 small pins, four wiper blades and four bladeholders.

Wiper assemblies

First, with your pin chuck in the small lathe at high speed or Dremel drill, reduce the diameter of each pin head to 1.2mm and the re-dome them. We did this with needle files while the job ran at high speed.

Take a blade and blade holder. Slip a pin through to join them. Snip off the excess close to the holder. The deformation on the pin protrusion left by the snipping off will retain the pin. The blade should rock a few degrees each way in the holder. Now take one long tapered arm and one short tapered arm and put a pin through each. We will now complete the assembly on the soldering table. Assemble them to the holder (two units with the long taper arm on the left and two units with the long taper arm to the right) and snip off the excess close to the holder. Put a piece of 3mm thick packing under the operating arms to help the assembly sit square. Now move two sets of operating arms in parallel so that they sit at 35 degrees to the plane of the blade. With a small tip soldering iron and fine resin cored solder (the Savbit as used on the electrics and electronics), solder the tops of the pinheads and operating arms to the blade holder. Now do the same to the remaining two sets of gear *except* move the operating arms in the opposite direction 35 degrees to the plane of the blade. Now checking that you have two right hand and two left hand assemblies, solder up the remaining two assemblies. Be sure that no solder gets near the wiper blade mount, as the swivelling of the blade must be retained to effect a firm sit on the window pane when they are installed on the locomotive.

Refer to Figure 85a and the holding blocks for the wipers on the locomotive. Each block is made from two M2 x 15mm setscrews and a piece of brass to finished size of 4 x 7 x 1.6mm thick. Four units are needed. We made the brass pieces out of a "stick", marked,

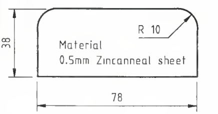
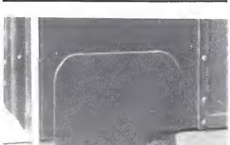


Figure 87 two required

STAFF EXCHANGER ACCESS BLANK COVER PLATE.



The cover plate over the staff exchanger access cut-out is just visible in this photo.

The insert after securing in the electric switch access removeable panel.

down. When a good painting key has been formed on the assemblies, paint them flat black with a waterproof hobby paint. We used Humbrol® Flat Black No.33.

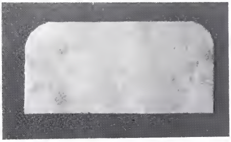
When dry, put a nut on each screw and wrap up the assemblies carefully. Put them aside until after the locomotive has been painted.

42218

If you are considering painting your 422 class in the one-off Bi-Centennial colour scheme, then you you will need to make a plate to sit inside the rectangular removable switch covers on each side. This is to provide a flat surface for the NSW "shooting stars" logo. We made our out of two in-fill pieces of 170 x 80 x 0.9mm thick zinc-anneal sheet. Before fitting, you will need to remove the brass porthole rings. The in-fill panels were fastened with four 10BA hexagon headed screws with flat washers under them in the locations shown in Figure 86. The base panel was drilled and tapped 10BA to accept the setscrews. After the panel is secured, file the protruding thread down flush on the inside.

Staff exchanger fill-in

Many of the class have had their staff exchangers removed. Not only that, a few of the class have had the opening covered over with a piece of plate. All we did with our loco was to cut out a piece of 0.55mm zinc anneal sheet to overlap the staff exchanger cut-out in the side panels. Basically it is a rectangle 78 x 38mm with 10mm radius at both the top corners as shown in Figure 87. After cutting out the covers, they were laid over cut-outs and then soft soldered to the main panel sides.



The staff exchanger cut-out cover, cut to size and ready to be tinned before attaching.

The method of soldering is to tin the body section first and tin the plate to be installed, then lay the plate in position and then gently heat around the edges until the solder runs, then remove the heat. When finished you will see a slight fillet along the edges. This is good as it simulates the railways practice of just welding a plate on top to cover up a hole!

End of detailing

The detailing is now complete as far as we are concerned. There were three extra items of detailing discussed by the 422 project team but have not been proceeded with.

- The bogie brake cylinder-to-cylinder piping is prominent along the bogie sides. However, it would look plain as just piping. A local manufacturer is looking at producing scale pipe fittings, i.e., unions, T-pieces and couplings. When these become available, we will do a retro-fit to our bogies and document the procedure.
- The staff exchanger is a horrible little bit of gear which has proven to be difficult to research. Most have been removed and to scratch build them would be a monster. Lost wax casting of the major pieces is being looked at. No promises though! If you have a loco version where the staff exchanger has been removed then this part is not relevant.
- We had looked at fitting the brake gear to our loco, but most of the rodding and linkage gear is at below bogie frame level. Since the locomotive has been designed as a workhorse and as such may suffer the inevitable derailments, such scale rigging could be damaged. Hence a conscious decision has been made not to fit the outer detailing of the brake rigging. However, if someone fits it to their locomotive, then we will run the story if they wish to document how they did it.

Part 23 Components List

Qty	Description
1.8m	2mm half-round brass rod
1 pce	1/8" dia. brass tube (K&S Metals)
1	350 x 80 x 0.9mm zincanneal sheet
200mm	0.5mm copper strip
250mm	50 x 1.2mm plastic panel board
3	2.5mm GP welding electrodes
60	0.9mm pins
8	M2 x 12 c'sunk steel setscrews
10	M2 x 15 c'sunk steel setscrews
16	M2.5 x 12 c'sunk steel setscrews
8	10BA Hex head setscrews
18	M2 steel nuts
20	M2.5 steel nuts
20	2.5mm steel flat washers
8	flat washers (for 10BA)
4	12 volt, 3 watt, 25mm cyl auto lamps
1	set of four windscreen wipers (from Scobie and Glover Sheetmetal)
1	tin humbrol enamel, No.33, flat black
1	bottle of thinners
1	small artists brush

This completes the locomotive construction as such.

Running hiccup

An unforeseen mishap happened to us on a recent outing of our 422. While running with a heavily loaded four-car passenger set, the loco derailed [through no fault of our 422...bmc] while going through a set of points. The inertia of the load pushed it along "in the dirt" for about two metres before stopping. Damage sustained? A crumpled front cowcatcher! How do you prevent this damage re-occurring in the future? Take a tip from us, remove the "front" cowcatcher before running on unfamiliar tracks on public running days. If a derailment occurs, the pilot apron will take the weight of the locomotive without suffering any damage.

Greasing and oiling

Operational procedures for the locomotive were outlined in AME Issue 52, Jan-Feb 1994, page 40. Since then we have come across a magic little gadget ideally suited for greasing the axleboxes. It is a one-shot grease gun, available from chain saw suppliers/repairers. We just give each axlebox one shot at the commencement of each running day. Chains are oiled sparingly with chain bar oil, available from the same source.

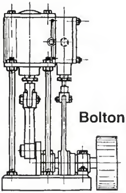
Next?

We will look at the various colour schemes worn by the class over the years, and document the minor external differences within particular members of the class at various times in their lives. In the meantime, have some fun with your locomotive.

To be continued...

Product Reviews

Building the Bolton No.5 Vertical Open Column Steam Engine — A Set Of Construction Notes by Ernest Winter


Bolton No.5

Construction Notes is a bit of an understatement for this book — Construction Manual would be more appropriate! It is an excellent guide to building a No.5 steam engine.

What's a No.5? It's a $\frac{5}{8}$" bore by $\frac{5}{8}$" stroke single cylinder steam engine. Ideal for marine applications or just to play with! Another excuse for building one is for practice before attempting your dream machine. There is a No.5 engine powering the launch featured on the cover of this issue of AME.

Ernie Winter's book covers every aspect you will need to know about constructing your first steam engine. Experienced modellers may find it a bit long-winded, but remember, we have to start somewhere. Experienced modellers could weed out the details they need and ignore the rest.

Beginner model engineers will relish every page! Right from page one — Ernie lays down the ground rules, rolls up his sleeves and gets right into the construction techniques. The difference is, you are taking advantage of Ernie's years of experience in the hobby plus his trade background.

Each section of the book deals with a component of the engine. Each manufacturing sequence is in a logical order and fully detailed. There is only one sketch in the book, but that is all that is required — Ernie refers to the No.5 plan sheets for reference during machining operations.

This is a great reference book for anybody interested in building stationary steam engines, regardless of size.

Price: $18 plus postage and packaging.

Available from: E. & J. Winter, PO Box 126, Wallsend, NSW, 2287.

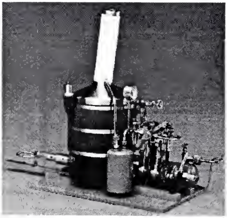
Brian Carter

Opal — a fast steam launch kit

This review of a $^1/_{10}$th scale fast steam launch from Marten, Howes and Baylis appeared in ***Model Boats****, March 1995, Nexus Special Interests Publication. It was part of a story by Ray Brigden about the manufacturer, Marten Howes and Baylis. Reproduced with kind permission of the editor John Cundell. The kit is available in Australia from Classic Marine Models International Pty. Ltd.*

...The 1907 Lune Valley Co's catalogue lists Opal's details a 35ft fast steam launch with a speed of 12 knots. Peter [Baylis] and Brian [Marten] have based their model on the information given in the catalogue and built to a scale of 1:10 that produces a model with a LOA of 42 inches. The steam plant is also to 1:10 scale and along with its light-weight boiler construction no doubt contributes toward the model's light weight of 8lbs [3.6kg], and helps its lively performance.

Peter and Brian look to have given their first kitted venture much thought and produced a package of quality that is on a par with the rest of their products. On opening the box the builder will not be disappointed with the good GRP hull or with the selected Midwest mahogany timber strip planking to shape the model's sloping decks. Opal's design and purpose left her decks uncluttered from fittings and tackle and allowed her pristine polished decks to be shown off, all of which can be faithfully reproduced on the model with the selected timbers provided, as can the delightful turning curves of the splash guard around the cockpit. How shy should one be of twisting and turning the timber to achieve the guard's shape? "Not at all" said Peter. The answer is to laminate the section. Fittings include masts, cleats, mooring rings, steer wheel, and boat hook, all made in brass, as is the boat's fancy skeg and propeller. The "olde worlde" leather-looking buttoned seat squabs not only look good they also feel right as they give with finger pressure. The squabs are modelled by Peter and Brian from their own moulds. Design and neatness of fitting the timber-built cabinets that support the cockpit's seating arrangement allows all the needed on-board radio control equipment to be fitted neatly out of sight and helps maintain the realistic profile of an open style launch model. [Paint, glue and radio control are not supplied].


The beautifully finished steam plant from the fast steam launch ***Opal****.*

The Opal's appearance around the shows and exhibitions [UK] has attracted much comment and a good number of fanciers.

Obviously and rightly pleased with their first venture into the kit market the cheerful duo from Gillingham will no doubt again be thumbing through their copy of the Lune Valley Co., catalogue for another steam driven classic. We look forward to their findings.

For price and availability, contact:

Classic Marine Models, 19 Porter St., Bondi Junction, NSW, 2022. (02) 389 5086

Micro Position Sensor

This little gadget has got to be the buy of the year. When I bought my new lathe in 1994, I was tempted to have an X-Y digital readout fitted, so I shopped around to see what was available. The prices were out of my reach at between $1500 and $2000 depending on quality. Sadly, I let the matter rest — until the Micro Position Sensor came along. I spoke to the distributor, who explained some of the features. The digital display gives you about 400mm or 16" of measurement in metric (0.01mm resolution) or imperial (0.001" resolution). The dislay is activated by an optical disk attached to a stainless steel wire that winds in and out of the case (under tension).

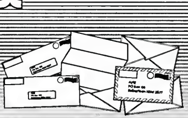
I haven't got much space left so I'll keep it brief for now and explain more fully with photos after I attach it properly to my machines. The uses I found for the sensor were: X and Z lathe axis. Tailstock spindle extension. Drill press quill feed depth. Milling machine table and quill travel. And maybe even as a vernier height gauge! Plus anywhere else you need to measure accurately. You only need one or two, and transfer them to each machine as needed for super digital accuracy!

Price: $415 including postage.

Available from: Sabanet P/L, 65 Woodbury Rd, St Ives, NSW, 2075. (02) 449 4415

Brian Carter

Letter Box



Poor instructions

Sir,

The water gauge jig in AME issue 62 was very good, and reminded me of a serious defect I ended up with during the making of my latest engine, *The Washington* by David Piddington.

After making the boiler, we soldered the bushes in place including the two flanged bushes for the throttle rod tube. It seems that, as careful as we were, the smoke box tube plate was installed slightly out of vertical. This was not noticed until the throttle tube, which is flanged on the front end for location, was installed. When it was pushed through from the front it was found to be too highat the rear. Unfortunately, the front throttle block is about 2 inches long and does not allow for any misalignment of the tube.

After the shock and despair, I decided the only fix was to give the tube a small bend in the middle. After trial and error — my favourite tool — the tube lined up and could be installed. The throttle rod also had to be bent to allow the throttle valve to move freely.

Comment: Surely this would have been apparent to an experienced designer, but not to a number of average builders.

I mark all my plans with pink highlighter and change the errors with red ink. I also draw boxes and write warnings in them, "machine this first", etc., after making a wrong move.

A warning on the boiler drawing could have said "Warning, to align the throttle bushes, a shaft passed through the boiler to align the bushes and allow the boiler plates to be soldered in the correct place is advisable."

When you consider that over 70 sets of plans have been sold world-wide, I wonder how many other builders have had this problem.

Conclusion: I am of the opinion that most articles in magazines and sets of plans are written and drawn by experts for experts.

Maurice Rachow

The gauges — a final word

Sir,

I read with interest the letters from both Barry Glover and Ross Bishop-Wear (RBW) in respect to the "Great 5" and 7¼" Debate" published in the September-October 1995 issue of AME.

May it be said that Barry Glover takes the high ground and reviews the issue from a strategic level. His comments capture the essence of the debate and succinctly identify the solutions. However, there still needs to be greater diligence on the part of clubs to maintain the appropriate standards and tolerances of dual gauge trackwork and ensure that operating practices are strictly enforced.

In respect to RBW's letter, one must certainly concur with the sentiments that we all want to have an enjoyable time operating in a safe environment. However, in this writers opinion, a number of his observations require some comment as they may not necessarily reflect the underlying issues and therefore lead to conclusions which are debatable.

1. RBW summarised his concerns in a dot point schedule. In the writers opinion none of these concerns relate to the fundamental issue of whether both gauges can or should co-exist with each other, i.e:

a) **Braking:** a safety issue. Training of Operators required. Signaling may be necessary in difficult operating locations. Engines and rolling stock should have adequate braking systems to the satisfaction of the driver, as the operator, and the club track marshall.

b) **Visibility from the Cab:** I know of no 7¼" gauge sit-in engines that have such a problem. If there is, then the revelant Club safety inspector should consider each case on its merits and make a recommendation to the committee.

c) **Human Error:** this is clearly a training issue.

d) **Diminished Pleasure** (small engines): if you have a problem then holler for a track marshall.

e) **Ditto Above** (rough track): track should comply with an agreed specification for section, cant, gauge and point tolerances. If not, speak to the track marshall or don't run.

f) **Ditto Above** (speeds, large engines): if the large engine operator is unable to operate intelligently and be patient then he/she shouldn't be on the track.

g) **Are both Gauges Compatible?** Yes, given respect by both groups to the inherent operating characteristics of each gauge. Lets face it, Clubs throughout Australia are doing it all the time.

2. RBW also raised a number of additional points in support of his proposition that we should separate the gauges.

Again, a number of his assumptions bear closer examination, i.e:

Re Axleloading

We are told that 5"g carriages have an axleload of 90-100kg compared to heavy 5" gauge locomotives at 60kg. We are then informed that 7¼" gauge locomotives have axleloads of 250kg and, that by inference this is the norm.

The conclusion drawn from the above data is that this axleloading damages the track and is a threat to 5" gauge operations. Do we also assume that clubs don't maintain the track?

Now the facts are that most large 7¼" gauge steam locomotives spread their weight over a larger number of bogie, coupled and tender axles and simply do not get near these values. For instance my 2-6-0 *La Quinta* has an axleload of 140kg and John Bones K 36 2-8-2 also comes in at about 140kg on the coupled axles and the equalised leading and trailing trucks. They run quite comfortably on 25 x 12mm steel track with a sleeper spacing of 10-12" and handle dual gauge turnouts without drama.

If that axleload and engine mass damages the track then I suggest that the track is grossly under-specified for normal 7¼" gauge operation. Diesel locomotives are generally much heavier, coming in at about 250-300kg axleload (so do most carriages for that matter). Even with these axleload values, standard 25 x 12 flat seems to cope quite well with sleeper spacing of 8-12", so what is the reasonable cut-off point in vehicle mass?

Re Wheel Standards

Yes, why do we have two wheel profile standards for 7¼" gauge? Well, I suggest that it is done for a number of quite valid reasons; some obvious, some not so obvious.

We run on a variety of rail types ranging from the 25 x 12 section to varying aluminium rail profiles, steel prototype rail, 14lb industrial rail and railway signal channel. All of these rail sections generate different rates of wear and with aluminium rail the flange angle becomes critical. Also, with worn and rounded railhead, deeper flanges are highly desirable to prevent a wheel from riding up on the railhead.

Consequently, the tendency has been to go to a bigger section flange to allow 17-20 degree flange angles and a thicker flange profile to lengthen wheel life on cast iron wheels, which also gives greater strength and reduces breaking of flanges in derailments.

Steel wheels are a better solution in part, but flange angles and the desire for longer life will ensure that the narrow gauge standard is here to stay. Putting it another way, the fine scale 7¼" gauge wheel profile is really under designed for todays operating environment. At least we 7¼" gauge modelers have a choice — whereas RBW has no choice in 5" gauge.

Re Narrow Gauge

A two foot gauge *Fowler* is not your average run of the mill narrow gauge locomotive.

It is small industrial unit designed to operate on very tight curves within a restrictive loading gauge.

An exeellent example of what ean be scaled down to 5" gauge is provided by the 2 foot South Afriean Hopefield and Avontuur Railways, whieh imported from the Baldwin loeomotive Works in America, a number of delightful 2-6-0, 4-6-0 and 4-6-2 Paeifie locomotives between 1901 and 1916.

Scaling models

Scaled down to 5" gauge the key dimensions of the 2-6-0 mogul comes out as follows:

The 4-6-0 and 4-6-2 engines were marginally bigger again in size and performanee. By any measure these engines are just as big as your average narrow gauge 2'6" or 3' gauge locomotives sealed down to 7¼" .

Therefore the *Fowler*, niee as it may be, is no indieator of what can be built in 5" gauge. In faet it is very similar to the diminutive 60em gauge Baldwin, Hunslet and Alco 4-6-0 and 2-6-2's built for serviee in Franee behind the Allied lines in World War 1. Consequently, it is highly likely that the 5" gauge fraternity will have to live with mueh bigger engines in the future anyway!

ITEM	FULL-SIZE imperial	SCALE-SIZE inches	mm
Length	43' 9"	109.375	2778
Width	7' 1"	17.7	449.6
Height	10' 4"	25.82	655.96
Boiler diameter	3' 3"	8.125	206
Boiler centreline	4' 8"	11.65	295.9
Coupled wheels	2' 9"	6.875	174.6
Coupled wheelbase	7'	17.5	444.5
Engine wheelbase	12' 10"	32.08	814.9
Tender wheelbase	13' 9"	34.375	873.125
Coupler height	1' 10"	4.58	116.4
Cylinder size	11¾" x 16"	2.45 x 3.33	62.23 x 84.45

In Conclusion

In the writers opinion there is no fundamental reason why 5" and 7¼" gauge equipment cannot co-exist together provided we maintain a eonsistent standard in the construction of traek and points, eneourage the use of track signalling systems, appoint traek marshalls to keep the eowboys in eheck and train drivers to operate safely and respeet fellow partieipants in the Hobby.

However some hallowed traditions may have to ehange. For instanee, in multi-gauge operation, moveable frogs may become essential as they are proven and ensure smooth operation, even though they ean be very unforgiving if run through in the opposite direetion.

In conclusion, with a bit of care and tolerance by all, safe and troublefree dual gauge operation is aehievable, and, in fact highly desirable for the economic well-being of the hobby. In this respect Barry Glover's letter sums it up very nicely, so *lets be proactive* and *make it work* rather than worry about trucks and bikes on the Hume Highway!

Robert Carlisle

Robert's letter arrived before I declared AME's support of the debate concluded. He put so much effort in it I decided to present it as — the final word.

It's time for clubs to solve the problem for their own situations... bmc.

News Desk

compiled by Brian Carter

Happy New Year to one and all! It seems strange writing this in October-November, but such is the life of deadlines. I trust you all had an enjoyable Christmas and Santa was feeling generous.

Cover price rise

I guess you've noticed by now that the Australian cover price has increased from previous issues. The increase to $5.50 was necessary due to the higher printing and paper costs. By comparison our increase is much smaller than most Australian based magazines have had to endure. The NZ cover price will remain the same for the time being.

There is a small increase to the annual subscription, which is now $29 (within Australia). NZ and overseas will remain the same.

Within Australia, the annual subscription works out at about $4.83 per issue, or a saving of $4 per year on the individual purchase price.

AME under 25s award

Over the last couple of years we have seen excellent work from model engineers slightly younger than most. I hope that the response this year will be greater than ever! It is an excellent opportunity for our younger friends to feel part of the "team" as it were. If you're under 25, brush off your project/s or finish them off , but get them to Penfield this Easter weekend. See pages 22 and 23 for details.

See you at Penfield, South Australia.

Cover photo

The November-December 1995 cover photo was taken by Graham Kirkby, not Neil Graham as stated in the caption. My apologies to Graham for the error.

Australian national model locomotive trials

The Illawarra Live Steamers are hosting the model locomotive trials at their grounds —Virginia Street, North Wollongong — on Friday 26 and Saturday 27 January 1996, commencing at 9.00am. 2½"g and 3½"g on the elevated track and 5"g only on the ground level track. To take part in the action, contact Barry Glover by phone (042) 84 0294 or Fax (042) 83 2331 by Friday 19 January 1996.

Warringah Model Engineers — a new club forming

A meeting of interest is being organised to establish the start of what will be "Warringah Model Engineers", a Sydney club catering for all facets of model engineering, like most clubs in their infancy, there is a lack of funds and no established property for tracks, grounds or lakes. Its first years of life will involve general meetings, get-togethers, BBQ's and possibly the building of a portable railway track.

A couple of keen modellers have taken up the challenge to get this venture up and running, The first meeting has been set down for early December 1995.

The meeting will be be over by the time you read this, so if this appeals to you why not give Bob a call on (02) 9971 1300 to get the latest news on the formation.

Trade and commercial

Melchester Engineering Pty. Ltd.

The ad for Melchester Engineering mentions a catalogue available for $10. I couldn't resist the temptation so I asked for one. When it arrived, I couldn't believe the size of it! The A4 size book has 154 pages including an index. A separate 15 page price list is also included in the envelope. Melchester offer a very large variety of tools and equipment. A particular strength is the very good range of horologists tools. They have loads of items every model engineer should have. While I haven't sampled their wares, the brand names listed in the catalogue suggest quality: Moore and Wright, Record, Mitutoyo, Eclipse, etc., and the prices seem very competitive. If nothing else, get the catalogue and droooo!!

E. & J. Winter

Small gauge loco models and stationary engines are an item often overlooked when thinking of the E. & J. Winter stable of models. Most people relate to Ernie's NSWGR 5"g range of locos. However, Ernie has reported a small increase in interest in 2½"g locomotives lately. Perhaps there really is a small gauge revival? A new product just launched is Russell Paynter's Hit & Miss Engine casting set, see the new ad in this issue.

Stolen model

It seems to be happening all too often these days, so be careful with your models and equipment!

The latest victim is a 5" gauge diesel outline electric powered F class locomotive. It is painted blue with a yellow band. It also has leads hanging out from under the driver's cab. Unfortunately, the photo supplied was not clear enough for publication. This six-coupled loco was stolen from the Williamstown Railway Museum, Victoria, around September-October 1995. If you can help with any information please contact AME and we will inform the owner.

Holiday thefts

Be very careful over the Christmas-New Year season, there are a lot of idle hands about. Keep your workshop securely locked when it is unattended. Make sure you have a good clear photo of each of your models it is a great help with future identification.

Some clubs have introduced a recording system to identify member's models. The member fills out a form and provides a photo which is glued to the form. These are stored with club records which means they are relatively safe.

Information super-railway

The internet is connected by lines — not roads! I had trouble accessing some of the WWW addresses I listed in the last issue, even though they were printed exactly as I received them. The first one on the list went through okay though. It was very good, and listed many model engineering features around Australia. In case you missed the last issue, the World Wide Web address was: http://www.bendigo.net.au/~jstein/livestm.html

If you want to have a chat with the Hutt Valley Society of Model Engineers (NZ) drop Charlie Lear a line on: hvmes@ibm.net

Besides email coming through from locations around Australia, I received one from Nebraska and another from Anchorage Alaska, enquiring about AME.

I won't bore you with comments about the internet in every issue, but if something interesting comes up I'll let you know.

A Model Milestone

Congratulations to Model Engineer (UK) who published their 4000th issue, dated 1 September 1995. I wish them well for the future, may they have many more.

As the Beatles are back in the news again I was reminded of one of their songs: "Will you still need me, will you still feed me, when I'm sixty-four" I hope you enjoy our 64th issue!

New Zealand distribution

Our apologies for the very late arrival of the New Zealand November-December issue. It seems that three-quarters of the November-December NZ magazines had been lost in transit. The printer had to run off some more, and send them by a different courier. The matter is out of our hands but we will do our best to ensure that you get your magazine.

I received news from the New Zealand distributor that the support for the July-August issue wasn't as strong as the May-June issue. While this is disappointing, we will keep trying for a while longer. The cover of this issue is a combined cover for both Australia and New Zealand. Under the circumstances it just isn't viable to produce two covers for each issue.

Classifieds

"Locomotion Miniature Railway" — 7¼" Gauge

- Lifestyle and tourist income opportunity on 3.5 acres of parkland picnic grounds overlooking the harbour. Authentic railway complex, historic Fremantle tram tearooms, 4 brm home, 2 brm holiday unit & much more. Very unique & heaps of potential. Urgent Sale $350,000 O.N.O. Contact Gwenda Giraudo on (098) 41 1822 or after hours on (098) 41 4571.

7¼"gauge Railway For Sale

- 3" Scale Baldwin Steam Loco, Electric Diesel Loco, Insp. Trolley, 6 Rolling Stock, Track etc. $12,500 Complete (08) 339 5062

MICROCRAFT PRESENTS...

- VHS Instructional Videos from the USA (PAL)
  Basic metal lathe operation Vol 1 & 2,
  Basic milling machine operation,
  Greensand casting techniques (foundry) Vol 1 & 2 and
  CNC X-Y-Z using car alternators (car alternators used as inexpensive power stepper motors!) $49.95 each plus $6 P&H, includes printed notes and diagrams
  * Credit cards accepted * Call Bob for more details:
  MICROCRAFT , PO Box 514 Concord, NSW, 2137
  Phone (02) 744 5440

Traditional English Traction Engines

- Drawings, castings, accessories for 3" to 6" scale. Complete boilers supplied with pressure certificate. Machining and gear cutting service available. Send £5.00 sterling (or alternately quote credit card number and date of expiry) for catalogue and price list to: Live Steam Models Unit 7, Old Hall Mills, Little Eaton, Derbyshire. DE21 5DN U.K. Phone: ISD+44 1332 830811
  Fax: ISD+44 1332 830050

Workshop Tooling

- A-Z Letter drills HSS in stand $95
  1-60 Number drill set HSS in stand $105
  Four different small tapered reamers $25
  NEW slitting saws 2¾" x 1" bore, 0.014" to 0.187" many sizes $20 each or three for $50.
  LPR TOOLMAKERS (057) 84 1351. See display ad.

BOILER — MANUFACTURER OF

- Custom made to suit your requirements, Wet-back — BRIGGS — Water-leg — to meet within AMBSC and DL1 boiler codes.
  Ph: (08) 255 4378 Fax (08) 380 9695, PO Box 321 Virginia 5120

DONKEY STEAM ENGINES FOR SALE

- Private collection suitable for enthusiast. 18 toy/models 1900 to 1970. For catalogue SAE to PO Box 304, Potts Point, NSW, 2011.

Subscribers Free Market

FOR SALE

Home Shop Machinist magazine from issue one 1982 to 1994, complete $390 including post within Australia. Ph Peter (09) 2503727.

7¼" gauge Portable track approx. 220 feet oval run $2200 ONO Contact John (07) 3204 5507.

Hot air engine in display case approx. one inch bore. Well finished mech and paint work. $300. Ph Barry (042) 84 0294.

5" gauge steel wheels $3\frac{3}{32}$" on tread. S.L.S. Standard profile $15.00 each or $40.00 a set on axle. T. Dickson (047) 511198.

Engineering in Miniature Vol's 1 to 6 bound, 7 to 16 loose. All mint condition. $390 the lot. OBO. Jeff (03) 9700 2436.

Drummond round bed lathe, very good condition, original CI stand, most accessories $600. Ph. Brian (02) 649 5301.

WANTED

Plans for Building Heisler by Kozo Hiroaka, Ph Rob (049) 82 9064.

Face Plate and drive plate suit 6½" centre height lathe with 2⅜" 6tpi thread. J. Mackie, Hillston, NSW.

Wanted a copy of Geo Thomas' manual on Building the Universal Pillar Tool. Call Dick on (049) 77 1409.

Wanted early Stanley or Locomotive Steam car parts, literature and information in any condition. Colin Wear (049) 97 4838.

Wanted Issue No. 24 Model Engineering workshop. Merv Olsson 34 Myrtle Grange, Brisbane, 4051, Ph (07) 33565688.

SWAP

Thin s/steel offcuts for bronze or brass offcuts. M. Hollensen.

HELP

Need oil firing details for 5" gauge live steam write please. George Coffee, 27 Cressington Way, Wallsend, 2287.

Classified rates

- $3.50 per line as published (including heading). As a rough guide, count 58 characters per line (including spaces and punctuation). No limit to the number of words.

Subscribers Free Market conditions

- Non-commercial only, at the publisher's discretion.
- Maximum of twenty words, including your contact name, phone number or address.
- Posted, on special form provided. No faxes please.
- 5" gauge or larger locomotives (for sale) are not eligible.
- Only one entry per issue.

DEADLINES for MARCH 1996

Display Advertising — 15 January

Classifieds — 20 January

Letter Box — 20 January

Did you know that an annual subscription to AME is only $29 (within Australia) per year? See page 3 for details.